# TRANSACTIONS and YEAR BOOK

of

## The University of Toronto Engineering Society



April, 1930

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## The University of Toronto Engineering Society

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THE LITTLE RED SCHOOL HOUSE

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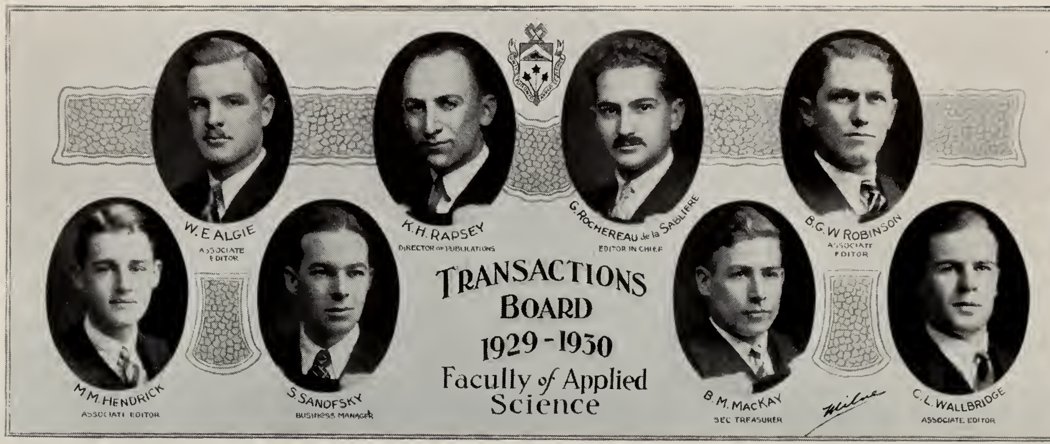
## Peter Gillespie

There are in this life men whose acts shine out through worldly gloom; and whose lives, when they pass beyond, continue to inspire those who remain behind.

Peter Gillespie, sometime Professor of Civil Engineering in the University of Toronto, through his unselfish devotion to teaching in the School of Practical Science and in the Faculty of Applied Science and Engineering is remembered by all with whom he came in contact as a lover of simplicity, a follower of liberal thought and a man of continued activity. But those who were privileged to exchange ideas with him could not but be impressed by the fact that liberality and breadth of thought held in it no place for those who seek progress by disregard of the convictions and loyalties of others. Rather was progress with him a gradual solidification that comes from reflection and consultation with many minds.

Gentle, kindly, firm and just, his life radiating with love of his fellow men, Peter Gillespie leaves an indestructible memory as a heritage from which all may seek inspiration.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# Transactions and Year Book

*of the*

University of Toronto Engineering Society

With which is incorporated "Applied Science"

PUBLISHED ANNUALLY BY THE SOCIETY

No. 43 TORONTO, APRIL, 1930 Price 50c




## Editorial

To its many members and friends, the Engineering Society presents the tenth edition of TRANSACTIONS as an annual publication, and it is hoped that the papers contained in this issue will prove useful as well as interesting to its readers.

Owing to the fact that there is no clearly defined policy for TRANSACTIONS, and that its appearance and contents are left entirely to the discretion of the board, the editors feel relieved of the difficult task of justifying any article which is or might have been printed in this issue.

In gathering material for TRANSACTIONS two addresses to the Engineering Society have been chosen, and while certain papers have been included which were not actually delivered before the Society, the aim has been to strike a happy medium between the super-technical paper and the general article.

At the first meeting of the Engineering Society, we were fortunate in having our Dean, Brig.-Gen. C. H. Mitchell, deliver a most interesting and instructive lecture on "Engineering Activity in Canada", a subject of general interest to everybody.

A second paper delivered before the Society and printed in this issue was that of D. S. Lloyd, a graduate of '25, who gave an illustrated lecture on "Gas Welding Progress in the Structural and Piping Fields".

A keen interest has of late been given to water power developments in Ontario. In view of this fact, the board deemed it advisable to publish two papers on hydraulics. Professor R. W. Angus, willingly gave us a non-technical treatise on "Development in Hydraulic Turbines", and the thesis chosen for this year is "Propeller Type Turbines", written by J. R. Crerar.

Through his recent work on Internal Combustion, Prof. E. A. Allcut has brought honour to the University, and to himself, and his work has been summarized in this issue by B. M. MacKay.

Since leaving the Department of Mechanical Engineering last September, Professor J. H. Parkin has been directing the Aeronautical Research at Ottawa. We were fortunate in securing his paper "Solving the Problems of Aviation in Canada".

We have received an interesting letter from a graduate and ex-member of the board of TRANSACTIONS, B. S. Shenstone, which we publish with pleasure. TRANSACTIONS always welcomes any comments or advice from the graduates of School.

In the YEAR BOOK, as usual, School shows why it holds such a prominent position in sports and social activities of this University.

To the Fourth Year Mechanical group picture, which has hitherto been the only one printed in the YEAR BOOK, has been added this year the group pictures of the Fourth Year members of the five other clubs. In this manner, if it is kept up, a permanent record of the passing fold may be kept in the Engineering Society.

The Board of TRANSACTIONS wishes to express their most hearty thanks to the members of the staff, graduates and undergraduates who have contributed in any way to the welfare of this publication.

# The Dean's Message for 1930

To the Members of the Engineering Society:—

Gentlemen:—

The Engineering Society is again to be congratulated upon a most successful year. At this time, when the activities of the Society have ended and its members are now all busy in the completion of their academic work for the Session, they can look back on the year's activities feeling that the time they have given to the Society's affairs has been well employed.

One of the outstanding features of the programmes of the Society's fortnightly meetings has been the diversity in character of the various addresses and papers given before the members. The contents of this volume of Transactions are an evidence of this and in this respect too, the Society is to be congratulated.

The past year has been one of great activity in engineering throughout Canada from coast to coast. Never in the history of the country has there been such a volume of engineering construction or such a diversity of it as the past year has witnessed. A

pleasing feature of this is that all branches of the engineering profession have been drawn into it. The Civil Engineers, the Mechanical, Electrical, Mining, Chemical and Metallurgical Engineers have all participated, as well as the Architects, who have had a very large part in the huge volume of building construction that has been in progress.

The members of the Fourth Year, now about to graduate, are all very fortunate in passing out into this active engineering world at this time and it will be with much interest that their comrades in the earlier years will watch their advent into the life of the country, while awaiting their own opportunity to join them at a later time.

In view of these successes and these prospects, I most heartily wish all members of the Engineering Society the best of good fortune in facing the future.

C. H. Mitchell,
*Dean.*

March 31, 1930.

# Address of Retiring President

Fellow School Men:

The Engineering Society has completed one of the most successful years of its history. In fact, I might say its most successful year. The Society has not only been exceedingly prosperous financially, but has found a high degree of success in all its activities. This was well exemplified in its major functions. This year, the School Dinner was the best held by the Society for twenty years. It was the aim of the Committee and the Executive to have every School man there. We almost attained our objective, for out of a registration of 700, there were 600 at the dinner. It certainly was a worth-while revival of a really exclusive School function. School Nite and the School At-Home were more popular than ever before. Tickets to both functions were at a premium. This, however, is not the only line in which School has attained fame and retained prestige. In every branch of athletics we accomplished a fair amount of success and carried off more than our fair share of honours. The whole, I believe reflects in no small degree on the "School Spirit". Certainly it is a great co-operative element. United as we are, we can do most anything. Yet some one must ably direct this. That is the duty of the Engineering Society Executive. I feel that they have done their task nobly; particularly Geo. Mason, Rus Armstrong, Bert Tyson and Gerry Wood. Then there are others who are not on the Executive, but who have assisted—such as Al. Rooke with School Nite and Reg. Rochester with the School At-Home. To these may well be added the personal co-operation and assistance of every School man.

A mere glance at the financial statement, which appears elsewhere in this issue, convinces us that we have had a thriving business. Our sales are higher than ever. This is in no small degree due to the unerring efforts of the Second Vice-President, Bert Tyson, in his courteous treatment of every member. The credit balance can well be attributed to the Engineering Society Executive, and their careful administration of the Society's affairs.

So far we have looked on the pleasant side of the situation. Certainly there is an unpleasant side. It is the Engineering Society Meetings. They have been the bug-bear of as many past Presidents as I have known. I need not repeat their feelings nor views. You have heard them—mine are the same. Imagine yourself walking

into C22 with a very prominent Engineer to address the Engineering Society and finding only fifty or sixty men there. Gentlemen, this is the only place you shirk your responsibility and do not take advantage of one of the fundamental principles for which the Society was founded. Enough said.

As I look back over the year, I review it with a great deal of pleasure and yet have a certain feeling of regret. Pleasure because I feel we have accomplished a great deal. Sorrow because I know that every Fourth Year man faces the prospect of graduating, and not only severing his ties with his fellow School men, but also with the Engineering Society. Here, gentlemen, I wish to thank you for the confidence you placed in me, and the co-operation you have given me. Particularly do I wish to thank the members of the Executive. It has been a great pleasure and a privilege to work with all of you, and to know we were all one for the same end. I would also like to express our appreciation to the Dean and the members of the Faculty for their many suggestions and their keen interest in the Society's affairs.

Before closing, let me present Bert Tyson, your new President. I feel assured that you will give him your whole-hearted support and co-operation. To you, Bert, goes my heartiest congratulations and hopes for a most successful year.

N. D. ADAMS,
*President.*

THE TRANSACTIONS
OF THE
University of Toronto Engineering Society
WITH WHICH IS INCORPORATED THE "APPLIED SCIENCE"

No. 43 TORONTO, APRIL, 1930 Price 50c.

# Engineering Activity in Canada*

By Brig.-Gen. C. H. Mitchell, C.B., C.M.E., C.E.
*Dean of the Faculty of Applied Science and Engineering, University of Toronto*

The present year has been notable in Engineering Activity in Canada. The general prosperity of the country has been reflected in a very large amount of engineering construction throughout the whole of the Dominion, from sea to sea.

It is of particular interest that this activity has been of a most diverse character, as it has included all branches of engineering wherein the development of the country is concerned. This has brought in the services of all classes of engineer, civil, mechanical, electrical, mining, chemical and metallurgical, and has included the architect as well, through the large amount of building construction.

In railway engineering, in the two great systems, with their aggregate of nearly 45,000 miles of line, there has been renewed activity in the construction of new branch lines, mostly in the west. Notable contributions, too, have been the construction of new fast and powerful locomotives, both steam and oil-electric. The large terminal work at Toronto, the Viaduct, is now nearing completion, and the new huge terminal programme at Montreal is already commenced.

In water transportation the outstanding activity is still the new Welland Ship Canal now almost completed; it is reported that it will be taken into use next summer. This is the greatest work of its kind in the world after the Panama Canal. The still greater project, the St. Lawrence Waterway, is still under discussion and has passed through the preliminary engineering stages. It would

*An address to the Engineering Society of the University of Toronto on October 21st, 1929.

appear that its construction will now not be long delayed. Agreements between the Provinces and the United States as to methods of construction are awaited.

In the paper industry no new mills have been built in the interior, but it is significant that there is new construction on the Atlantic Coast where ocean transportation and export facilities are advantageous factors.

The mining industry has advanced in a remarkable manner in the past few years and has involved engineering of a large extent and diverse character. The metallurgical side, too, has seen great activity in the construction of new or increased size smelters in Quebec, Ontario, Saskatchewan and British Columbia.

It has been in water power, however, that the past few years, and especially the present one, have seen most extraordinary activity. New plants in Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia—all the provinces of the Dominion—have been, and are at present under construction, aggregating hundreds of thousands of horsepower. The prospects, too, for the next year point to even greater development and in some instances programmes include construction running over several years to come. One of the most notable and significant new developments commenced is the Beauharnois Power on the St. Lawrence, a half-million horsepower project, significant because of its connection with the much-talked-of St. Lawrence Waterway Project.

In building construction, too, the new work already finished or under way during the year has proved to be the greatest in volume by far, that this country has experienced. In Toronto alone, where activity in this branch of engineering comes more especially under notice, the great number of large and prominent buildings have brought into service structural engineers and architects, mechanical and electrical engineers in large numbers. Closely allied with this is bridge engineering, the most notable examples of which have been the High Level Bridge over Montreal Harbour, and the Suspension bridge between Windsor and Detroit, both 150 feet above the water.

In order to bring this survey closer home and more in detail, the remarkable engineering activities which are actually in progress in Canada to-day are tabulated below, proceeding from Coast to Coast. At the end of the tabulation various engineering activities and features are added, which geographically cannot well be allocated to any particular part of the country:

### Engineering Works in Canada under Construction or Finished in 1929

Halifax—Grain elevator completed, now doubling capacity.

St. John—New docks, C.P.R., for ocean liners.

Mersey River—New Hydro-Electric Power Plant, N.S. Government, 10,000 h.p.

Grand Falls, N.B.—Power Plant completed.
Moncton—Oil fields producing Diesel and lubricating oils.
Anticosti—Pulp supply development (4 companies).
Gaspe—Road around Peninsula. Minerals and oil being discovered.
Chicoutimi—New harbour works.
Arvida—Aluminum Company. Second largest plant in world.
River Bend—Price Bros. mill—latest design.
Isle Maligne—Duke Price Power Plant completed, 500,000 h.p.
Mistassini—New paper mill and railway around Lake St. John.
Murray Bay—Manoir Richelieu (winter construction) in 9 months.
Montreal—New harbour works, extensions. New high level bridge over harbour. Black River power, 100,000 h.p. Office buildings—Royal Bank. Shawinigan transmission lines extended. St. Maurice River—additional storage dams.
St. Lawrence—Beauharnois Power Co., 500,000 h.p. project on St. Lawrence between Lakes St. Francis and St. Louis, about to be commenced.
Gatineau River — Power plants—Chelsea and Paguan Falls, 220,000 v. transmitting 230 miles to Toronto. Total about 300,000 h.p.
Ottawa River—Chats Rapids Hydro-Electric Power, starting.
Ottawa Valley—Consolidation Ontario Hydro plants.
Prescott—Dominion Government grain elevator, building.
Kingston—"6100" locomotives, 52 built, C.N.R., largest and fastest in world. New 5,000,000 bushel elevator building.
Toronto—Water Works extension. Harbour development. Viaduct completing. New motor-electric locomotive, C.N.R. (Experimental). Building construction: Royal York Hotel, Star Building, Canada Permanent Building, Bank of Commerce, Eaton's Building. New bridges, city streets and extensions.
Welland Ship Canal—Now about completed, 3 locks and levels open.
Hamilton—New docks—Canada Steamship Company.
Windsor—New highway tunnel. New highway "Ambassador" bridge; Suspension. C.N.R. Terminal Works.
Northern Ontario—Coal discovery. Clay investigations.
Northern Quebec Mining—Rouyn district. Metallurgical — Noranda Copper Smelter. Lead Plant building (3rd in Canada).
Northern Ontario—New paper developments—Spruce Falls Co., at Kapuskasing.
Fort William and Port Arthur—Additional Elevator capacity (now 40 mill.).
Shipbuilding on Great Lakes—Collingwood, grain boats, etc., oil boats (Imperial Oil) (32 new vessels delivered this summer, 3 canadian).
Winnipeg—New Seven Sisters Hydro-Electric Plant.

Manitoba—Mining activity: Now in North-East Province. Flin Flon Mine and Zinc Plant (2nd in Canada).

Saskatchewan — Hudson Bay Railway completed from Pas. Churchill Harbour Terminals—grain elevator (1st small shipment October, 1929). Mining in North. Improvement in concrete in alkali soils.

Alberta—Bow River power. "Ghost" Plant, 35,000 h.p., Calgary Power Company, completed. Oil fields developed, Turner Valley, etc. Peace River development.

British Columbia—Bridge River power; building. Cariboo Trail. Stave Lake Power extensions. B.C. Government Railway project extension inland. Consolidated Smelters (Trail) extensions. Copper and lead metallurgy. New sulphuric acid plant (for fertilizer; in soluble phosphate and ammonium nitrate form). Nitrogen lxation plant (for making synthetic ammonia, etc., and hydrogen by electrolysis).

Vancouver—Harbour works progressing on large scale. Elevators (capacity now 15 mill.). New bridge across "Narrows" to N. shore. City extensions.

Victoria—Esquimault dry dock into operation, 1928. (Largest on Pacific Coast).

## Miscellaneous and General

1. Agriculture—The progress due to introduction of: Motor implements. The "Swather". The "Combine" Harvester.
2. Television—Rapid progress in two years.
3. Researches—Dominion and Province of Ontario, and University: Iron—low grade. Coal—Northern Ontario and West. Gas.
4. Chemical Industry—Synthetic processes requiring high pressures: Nitrogen, Ammonia, Motor Spirit, Gasolene, etc. Artificial silk industry: Rayon. Refining of gasolene: Propane (5%), Butanes (2%). Used now in cylinders or tank cars for heating. "Bottled gas".
5. Aviation—Progress in areoplanes: Ground organization, Airports, Air companies, Business by air.
6. Railway Extensions—Mainly in West, both systems. 1200 miles under way by C.N.R. alone, exclusive of Hudson Bay Railway.
7. St. Lawrence Waterway—Preliminaries progressing. Navigation and power. Beauharnois power, 500,000 h.p., now starting. Excavation St. Lawrence Thousand Islands channels.

# Propeller Type Turbines

*A Thesis for the Degree of B.A.Sc.*

By J. R. Crerar

The propeller type runner is a high specific speed runner, and so has found application to low head water power developments. It has been introduced and applied considerably on this continent although the original development took place in Europe. In this connection, much credit is due to the work of Dr. Kaplan of Austria, Dr. Dubs, and Mr. Lewis F. Moody and Mr. Forrest Nagler of this continent. (1)

Until about ten or twelve years ago, hydraulic turbine practice had arrived at a more or less temporary standstill, with the development and application of the Francis turbine as had then been reached. (2) About that time, due to the fact that available high head water power resources were decreasing, and also because of the increasing pressure of competition in the power field arising from the growing application of steam turbines, internal combustion engines, etc., attention was called to the necessity of developing a runner of high specific speed, such as would be applicable to low head developments. This field has been filled to a large extent by the propeller type turbine, of which some of the outstanding features are discussed here. The term "propeller" turbine may be interpreted so as to exclude the Kaplan turbine, but since in this type the runner is really only a modification of the propeller class, it has been thought advisable to deal with this type, as well as what may be referred to as the ordinary propeller runner. In this paper no attempt has been made to deal with any of the aspects of the subject in great detail, but topics dealing with features of construction, characteristics, and field of application, have been considered with the object of bringing out the hydraulic and mechanical problems involved in this type of turbine. Propeller turbines with their various modifications have been compared with the high speed Francis turbine, since the latter may also be applied to the low head field. It it hoped that in this way it will be shown to just what extent, and with what limitations, the propeller turbine fills the requirements of the low head plant.

The need for a runner having a high specific speed for low heads can be shown by the equation relating speed, power, and head thus,—

$$N_S \frac{N\sqrt{P}}{H^{5/4}} \text{ or } N = \frac{N_S \times H^{5/4}}{\sqrt{P}}$$

where,—$N_S$ = specific speed,
$N$ = speed of unit in revolutions per minute,
$P$ = power of unit in horse power,
and $H$ = head on unit in feet.

An inspection of the equation will show that for a unit which is to develop a considerable block of power, under a low head, the specific speed must be high to keep the speed of the turbine above the limits set by practice and capital cost. The limit of specific speed for Francis runners is about 80 or 90 in English units, whereas propeller runners have been installed with specific speeds well over 200.

## Features of Construction

The propeller runner is the latest stage in the development of turbine runners and in dealing with this topic it might be of interest to trace the changes in construction in some of the older models which led to this type of runner. In Figure 1, are shown diagrammatic sketches of some of the types of turbines referred to. The original reaction turbine developed by Francis was of the radial inward flow type. The water was deflected to an axial direction after it had passed through the runner blades. Following this was the American or mixed flow types in which the axial deflection commenced to take place during the passage through the runner vanes. (This type is now usually referred to under the Francis runner class.) The main changes in construction from the radial flow type lay in the runner blades themselves, which took a more diagonal position with reference to the axis in the latter model. The result was an increase in specific speed and this may be considered as an early step toward the present propeller runner. A closer approach is shown in the form developed by Dr. Dubs for the Escher-Wyss Company, the blades of which incline still more closely to the horizontal, but which still retains the outer band or shrouding. Now to pass to the propeller runner involves changes which may be briefly summarized as follows,— (3)

(a) The removal of the shroud ring so that the blades rotate within a stationary wall (viz,—the throat ring of the draft tube). With high speed runners of this type the relative velocity is higher than the absolute, and therefore the use of a stationary wall or throat ring eliminates friction losses.

(b) The use of a wider space between the guide vanes and the inflow edges of the runner blades, during which the path of the water is deflected from a radial to a diagonal or even completely axial direction. The type developed by Moody, as shown in Fig. 1 is the diagonal type, whereas the models of Kaplan are practically purely axial flow turbines.

(c) A reduced blade surface, so that in many cases the blades do not overlap, but have clear openings between them.

(d) A smaller number of blades. Most propeller runners have not more than eight blades, four being the usual number.

A recent development in propeller runners is the adjustable blade type. These may be divided into two classes,—

1. The type in which the blade angles are adjusted periodically to suit seasonal variations in head.

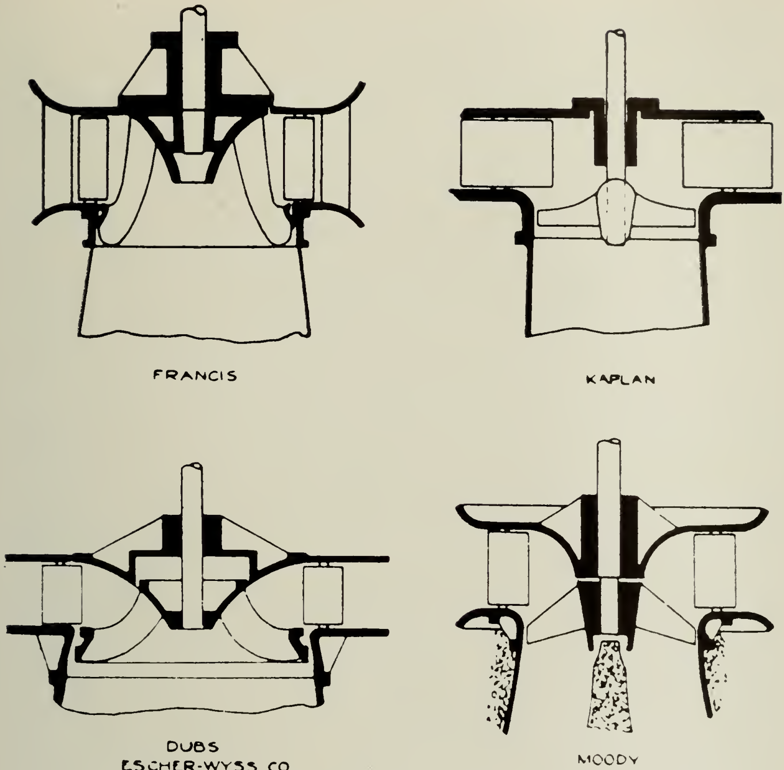



Fig. 1.—Comparison of High Speed Turbines.

2. The Kaplan type, in which the blade angles change automatically with the load, being controlled by the governor.

The first type has had some application on this continent already. Its principal use is in low head plants where the spring freshets cause a considerable elevation in the tailwater level, resulting in a lower head. For ordinary conditions during other parts of the year, the blades are fixed in a forward, or comparatively flat position, which is usually designed for the most efficient operation. In the spring, however, the blades are turned back several degrees so as to increase the discharge and keep the power up under a smaller head. This is done at a sacrifice in efficiency, as will be shown later, but this is of little consequence, since, during the flood season, a large amount of water is going over the spillway, even at peak loads. The range of shift is from ten to fifteen degrees. In this type the runner blades and hub are, of course, cast separately, each blade being cast with a large circular pad and a stem or shaft which fit into bored recesses in the hub. The blade shifting may be done directly at the runner, using some sort of

clamp or wedge arrangement, or a more complicated mechanism may be used.

The second type of movable blade runner, known as the "Kaplan runner" was invented by Dr. Kaplan of Austria. Many installations of this type have been made in Europe but until now, few Kaplan turbines have been installed on this continent. However, a large manufacturing company in America has recently obtained the manufacturing rights for these units, and there will be more applications of this type on the American continent in the near future. The blades on the Kaplan runner are movable and are shifted by some sort of governor controlled operating mechanism to make the runner blades suit the load. It is purely an effort to increase the part gate efficiency by changing the blade angles and therefore is not to be confused with the first type of movable blade runner in which the unit has to be shut down and the blades shifted by hand, so to speak, for the purpose of increasing the power under reduced heads.

It is obviously impossible in a paper of this length to describe very fully the automatic blade shifting devices, but a brief outline will, no doubt, serve to convey to the reader an idea of the principles which have been employed. Beginning at the runner blades themselves, it will be seen that they must have stems fitting into the hub about which they can turn. The system usually adopted is to have some sort of crank and connecting link mechanism on the blade stems inside the hub, these being operated by a shaft which moves up and down inside the hollow mainshaft of the turbine. Then the remaining requirement is a device which will place the movement of the central or operating shaft under the control of the governor. This involves the mechanical problem of a connection between the operating shaft which rotates with the turbine, and the governor which is a separate machine, usually. Various methods have been tried out and new ones are constantly being brought forward with the purpose of eliminating defects in previous methods. A short summary of some of these devices will give an idea of the general methods employed, although it should be remarked that some of these methods are already out of date.

In turbines of any size it would seem logical to adopt a system involving a servo-motor or operating cylinder, with pressure controlled by the governor, as in the case of the gate operating mechanism. This servo-motor may be used in several ways. If neither the cylinder nor piston are fastened on the central operating shaft, then some strictly mechanical means of co-relating the movement of the operating shaft and the servo-motor piston must be employed. A sort of floating collar which rotates with the shaft and which is moved up and down by a ring or fork has been used, although, as may well be understood, the mechanical details of such a connecttion may vary greatly. Another system is to have the operating piston connected directly on to the central shaft and so rotating inside a stationary cylinder. This method, although only several years old, has been discarded more or less because the piston tended

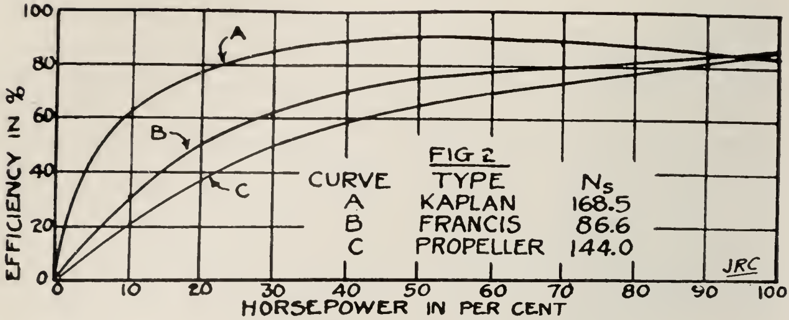
to wear a groove in the cylinder liner, at its location corresponding to full load. A third method is to have both cylinder and piston rotate with the turbine, thus simplifying the problem down to a connection between a stationary pipe and the rotating parts, so that a pressure connection to the cylinder may be obtained. It is the practice at present to use a separate servo-motor for blade adjusting and for gate opening, since by doing so each one may be designed with a different time of operation. The servo-motors on the gates are usually designed nowadays to completely close the gates from the full load position in a very short time, two to five seconds being common, whereas the time of the runner blade servo-motors is usually nearer fifteen seconds. In this way the blade adjusting mechanism does not operate unless there is a change of load of relatively long duration. (4)

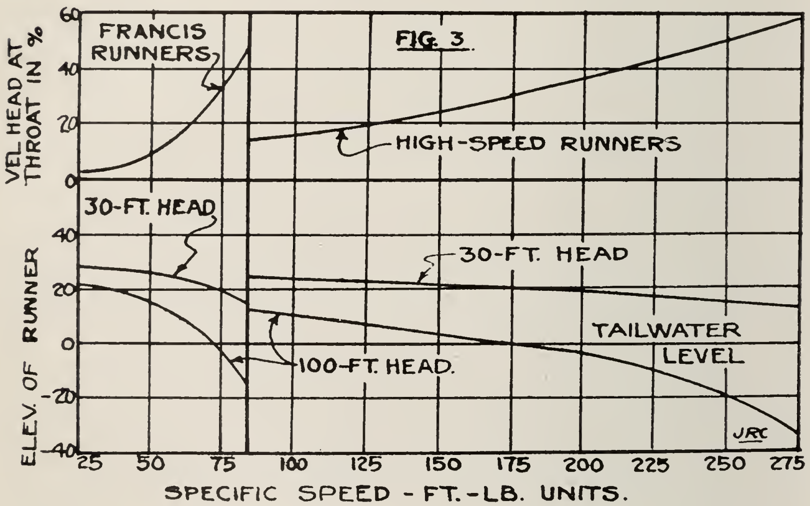
It might be interesting to note here that although propeller runners have specific speeds of about twice that of high-speed Francis runners, yet for corersponding wheels of each type the diameter is nearly the same, due to the fact that the value of "Ø" used for propeller runners is also about twice that used for Francis runners.

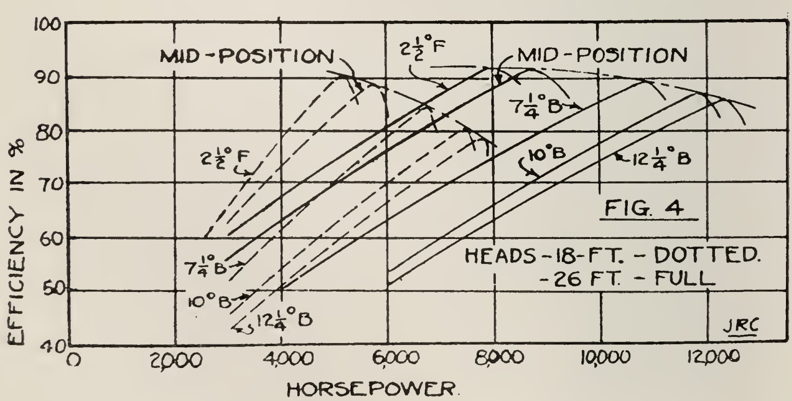
The turbine setting and other equipment has been affected in some details by the use of propeller runners. The angle of the speed vanes with the tangential is somewhat larger for propeller installations than for the Francis type. The usual full-gate angle of guide vanes for propeller turbines is between forty and fifty degrees, as compared with twenty-two to thirty-five degrees for Francis type installations. The tendency is for the angle to increase with the specific speed, but the change is also due to the essential differences in construction between the two runners. Figure 1 shows the differences in construction of the head covers of Francis and propeller turbines and also the essential changes in the contour of the throat ring.

## The Draft Tube

The use of high specific speed runners in turbine installations involves certain requirements on the draft tube which may be outlined as follows: In order to obtain a high specific speed the water is allowed to leave the runner with considerable whirl component, still left in it, thus increasing the velocity head at the draft tube throat considerably. On account of the whirl such draft tubes as the elbow type are obviously unsuitable, it being evident that this condition requires a draft tube symmetrical about the centre line. Furthermore, this increased throat velocity (which is higher when a propeller runner is used, even neglecting the whirl effect), has the effect of lowering the allowable height of the runner above the tailwater as shown in Figure 3, (5) and the following equation. The upper part of the figure shows curves of velocity head at the draft tube throat plotted against specific speed. These are taken from


EFFICIENCY IN %
HORSEPOWER IN PER CENT
A
B
C
FIG 2
CURVE TYPE $N_S$
A KAPLAN 168.5
B FRANCIS 86.6
C PROPELLER 144.0
JRC


VEL. HEAD AT THROAT IN %
FIG. 3
FRANCIS RUNNERS
HIGH-SPEED RUNNERS
ELEV. OF RUNNER
30-FT. HEAD
30-FT. HEAD
100-FT. HEAD.
TAILWATER LEVEL
JRC
SPECIFIC SPEED - FT.-LB. UNITS.


EFFICIENCY IN %
MID-POSITION
$2\frac{1}{2}°$ F
MID-POSITION
$7\frac{1}{4}°$ B
$2\frac{1}{2}°$ F
$10°$ B
$12\frac{1}{4}°$ B
FIG. 4
$7\frac{1}{4}°$ B
$10°$ B
$12\frac{1}{4}°$ B
HEADS - 18-FT. - DOTTED.
-26 FT. - FULL
JRC
HORSEPOWER.

the usual average values used in practice. It will be noted that with the propeller runner, the runner has a larger throat diameter than the corresponding Francis runner of the same specific speed. (This should not be confused with a previous statement concerning the relative diameters of propeller and Francis runners for the same power and heads *but of different specific speeds.*) Hence the throat velocity can be kept lower in propeller units. Now the relation for height of runner above tailwater may be written as follows: (6)

$$Z_2 = \left(\frac{P_a}{w} - \frac{P_2}{w}\right) - e\frac{v_2^2}{Zg} \text{(for steady flow)}$$

where,—$Z_2$ = height of runner above tailwater level,

$P_a$ = atmospheric pressure in lbs. per sq. ft.,

$P_2$ = absolute pressure at throat in lbs. per sq. ft.,

w = the weight of water per cubic foot,

hence $\left(\frac{P_a}{w} - \frac{P_2}{w}\right)$ = total allowable draft head on unit,

e = efficiency of draft tube,

$v_2$ = velocity at throat in feet per second.

Now the variation in "$v_2$" with respect to specific speed for both types of runners is shown on the upper part of the figure, and a draft tube efficiency of eighty per cent. has been assumed, and the value of "$\left(\frac{P_a}{w} - \frac{P_2}{w}\right)$" is considered constant for all heads, the values being shown on the left hand side of the curve where the velocity head at the throat is zero. With this data, the values of "$Z_2$" can be obtained and the lower portion of the figure shows curves of "$Z_2$" plotted on specific speed for both types of runner. A limit in the specific speed of Francis runners is soon reached due to the rapid decrease in the allowable height of the runner above tailwater. Higher specific speeds may be employed, however, by using propeller runners, because, as was mentioned above, for the same specific speeds, the propeller runner would have a larger throat diameter than the Francis type. In other words, if a propeller runner were constructed with the same throat diameter as another runner of the Francis type, the former would have a higher specific speed. There is little doubt but what the needs arising from the use of high speed runners have influenced the present design of draft tubes considerably, such types as the Moody cone, the White hydracone, and the ordinary spreading concentric draft tube being quite suited. As will be seen from the curve, future attempts at increased specific speeds may involve the problem of placing the runner below the tailwater level. Suggestions have been brought forward for this, such as the inverted turbine, but space does not permit any detailed descriptions here.

Fig. 5.—Comparison of Propeller and Francis Runners for the Same Power and Head.

## Characteristics

In dealing with the performance of propeller turbines it will perhaps be best to first consider the runner to be of the fixed blade type, then proceed to investigate the modifications or advantages involved in the use of adjustable blades for variable heads and finally deal with the Kaplan turbine. Figure 2, (4) affords a comparison of the efficiencies of turbines of various specific speeds, with varying load and constant head and speed. The curves shown are for models with a sixteen-inch throat diameter, tested at the laboratory of the I. P. Morris Company. Curve "B" is for a Francis turbine of a comparatively high specific speed for this type, (86.6). This model was used in the Cedar Rapids development,

each unit being originally designed to deliver 10,800 horse-power and operate at 55.6 revolutions per minute, under a normal head of 30 ft. (The horse-power was later increased however by cutting back the outflow edges of the runner). (1) A comparison between the performance of this runner and that of propeller models is quite significant since conditions of head and power such as mentioned above fall well within the field of application of a propeller turbine. Curve "C" is for a six bladed propeller model of the diagonal type, as developed by Lewis F. Moody, and shows a very fair performance for such a runner. It will be noted, however, that there is a considerable reduction in efficiency at part gate as compared with the Francis runner. (Curve "C" is for a four-bladed axial type runner having a high specific speed, and showing very low part-load efficiency.) The Francis model of curve "A" was also tested at Holyoke with a model of about double the throat diameter and gave an efficiency of 90 per cent., so an increase of 4 or 5 per cent. on the efficiency.) The Francis model of curve "B" was also tested at installations. (2)

The next step is a consideration of the effects and possibilities produced by using runners in which the blade angles may be varied for different heads. Figure 4 serves to illustrate this point, the curve being for an installation at Back River, Quebec, of the Montreal Island Power Company. The normal head is 26 feet, and during spring flood conditions it is about 18 feet. The runner is designed so that the maximum efficiency is obtained when operating near rated load, with blades in the most forward (or flattest) position. The curve sheet shows test results for different angles at the two heads mentioned above, and for each head an envelope curve has been drawn through the points of maximum efficiency. Thus, for any head, the maximum available power may be increased above rated at a slight sacrifice in efficiency by shifting the blades back.

To make this clear, let us consider an actual example from the curve sheet. When operating at 26 feet of head with blades in the 2½ degrees forward position, the efficiency is 92 per cent and the horse power 8000 (approximately). (Note:—There is slight margin over this power before the maximum available is reached under these conditions.) Now if the head is reduced to 18 feet and the blades remain in the same position the maximum efficiency is 90.5 per cent. and power delivered is 5300 horse-power. But, if the blades are shifted to, say, the 12¼ degrees back position the power is 7600 horse-power with an efficiency of 79 per cent. Hence by shifting the blades the power has been increased 2300 horse-power, but there is a loss in efficiency of about 11.5 per cent. Under spring flood conditions there is plenty of water going over the spillway, but insufficient head, and so it is desirable, mainly, to increase the capacity of the unit under this low head, the efficiency being a minor consideration.

In this connection some mention should be made of the ejector turbine, which is another means of maintaining power at reduced

heads. In this turbine there are "ejector gates" between the casing and the draft tube throat so that under low heads additional water may be by-passed through them causing a higher throat velocity, hence a higher draft head and higher total head. It has been found that considerable gain in power may be had at a sacrifice in efficiency as is the case with the adjustable blade runner. The ejector principle has been applied in a slightly different form at the power plant of the Montreal Island Power Company at Back River, Quebec, where ejector gates connect the forebay and the tailrace. The added velocity in the tailrace cause a "hydraulic lift" at the exit passage which lowers the effective tailwater level. (5)

There now remains to be dealt with the results in part load efficiency obtained by the feathering of the blades in the Kaplan runner. Figure 2A shows a typical efficiency curve of a Kaplan runner compared with those of a high speed Francis runner and an ordinary propeller runner. (7) It will be seen that the Kaplan runner keeps up its efficiency at part gate even better than the Francis and much better than the ordinary propeller runner, although its specific speed is higher than that of the propeller runner. This indicates, therefore, that the low part load efficiency of the ordinary propeller turbines is due almost entirely to the fact that the blade angle is unsuitable for part gate conditions. It might be mentioned that the curves of Figure 4 afford a key to the development of the Kaplan runner efficiency curve. It will be noticed that the Kaplan turbine has even a higher efficiency at half load than at full load, and this tendency seems to be borne out in the portion of the curve shown in Figure 4. Although the latter is for a different type of turbine runner, the envelope curves should be expected to show much the same characteristics as the Kaplan type of runner. It should be noted, however, that the form of the curve for the Kaplan runner depends on the design of the operating mechanism. Obviously, for each load, there is a certain blade angle, at which the maximum efficiency for that load will be obtained. On this account, a very extensive study has been made in Europe of the blade shifting mechanism, with the object of obtaining a design so proportioned as to have the blades as near as possible to the correct angle, for each load. It is the object in this type of turbine to have the efficiency as near as possible to the maximum over a range from about half load to rated load, and in the present example, it will be seen that the efficiency remains up fairly well down to about one-quarter of full load.

### Propeller Turbines Compared with Francis Turbines

A comparison has been made below of the high-speed Francis runner and the ordinary propeller runner. Since the Kaplan runner is primarily of the same class as the propeller runner proper, it will be evident that many of the advantages mentioned below also apply to the Kaplan type. The merits of the propeller turbine may be briefly summarized as follows:

1. Owing to the higher speeds obtained with propeller runners, the size and cost of the generator is reduced considerably, and in consequence so, also, is the size of the power-house crane and superstructure.

2. The mechanical strength of the propeller runner is greater, usually, on account of the long connection between the blades and the hub.

3. Due to the smaller number of vanes in the propeller runner, with consequent wider spaces between them, there is less danger of clogging with foreign materials and hence the trash racks may be of a wider spacing.

4. Since a propeller runner for a given installation is lighter than the corresponding Francis runner there is considerable saving in the weight of revolving parts.

5. Because of the absence of the shroud ring on propeller runners, the vanes may be cast separately and bolted to the hub. Thus, when one blade is damaged, it may be replaced separately without renewing the whole runner.

6. The passage of the water through the propeller runner is more direct than in the Francis type, and so the design of blades is simpler. Also, the throat diameter of the propeller runner is roughly the same as that of the corresponding Francis runner, and hence the discharge velocity in both are about the same. From the above it would appear that the danger of corrosion, etc., in a properly designed installation of the propeller type was less.

7. The ability of the adjustable blade propeller runner to keep up its power at reduced heads is a decided advantage. At low heads, seasonal variations in head are usually very large, and so this qualification is of special importance.

In certain respects the Francis turbine is superior to the propeller, but these are of minor importance, being liable to cause difficulties only under special circumstances. For instance, the low part-hold efficiency of the ordinary propeller runner would affect the overall efficiency of a plant where there was only one or two units in the installation. Also, a case might arise where the light weight of the revolving parts in a propeller unit, might hamper the designer from a speed regulation standpoint, on account of the small $WR^2$ effect obtainable.

Kaplan turbines, on the other hand, combine some of the most favourable qualities of both the ordinary propeller and the Francis type. Like the propeller turbines, they have all the advantages arising from their high specific speed as well as those arising from the features of construction of the runner. On the other hand they hold up their efficiency at part load even better than high-speed Francis turbines, as has been shown. One possible objection to the Kaplan unit is the added complication and cost of the blade shifting mechanism. This is an additional cost to the ordinary propeller runner, but compared with the Francis turbine, it is doubtful which would prove the deciding factor, the increased cost

of the electrical equipment for the Francis type, or the cost of the operating mechanism on the Kaplan unit.

## Application of Propeller Turbines in Multiple Unit Installations

The design of a water power development is influenced by several factors which are common to nearly all such installations, in addition to which, each individual case has its own special features, which also affect the proportioning and choice of turbines. The data which affords a basis for the design may be briefly summarized as follows:

(1) Flow conditions of the stream or river showing variations in discharge and head throughout the year (*e.g.* — results of a hydrographic survey).

(2) Total horse-power of installation; this will be governed by (1).

(3) Probable daily and seasonal variations in the load on the plant.

From this the designer proceeds to fix the number and size of turbines to be used, and to decide what type of runner is to be employed. The stream flow date is especially important in the case of low head plants as the spring floods tend to raise the tailwater level, and to seriously reduce the effective head. Propeller turbines have the advantage over Francis, in this respect, due to the fact that they can maintain their power to a greater extent under reduced heads (8). In employing the fixed blade type of propeller turbines for an installation rather than the high-speed Francis type, two main factors must be considered.

1. The low efficiency of a high-speed propeller turbine at part loads as compared with the Francis type.

2. The saving in initial cost in the case of a high-speed turbine. In addition to the increased economy in construction of turbine, generator, crane and superstructure, etc., there is the saving due to the fact that fewer units may be used in the case of the propeller type turbine. At low heads a limit in the capacity of Francis turbines is soon reached as the cost becomes prohibitive at high powers, with consequent slow speeds.

The importance of the first factor diminishes as the number of units in the plant increases, since a relatively high station efficiency may be obtained at part loads, by operating a sufficient number of units at rated capacity, (hence maximum efficiency), to meet the demand on the plant. Therefore the object of the designer is to choose a model having specific speed such as will effect a compromise between the two factors mentioned above, and so obtain maximum economy. The logical method of accomplishing this object in most cases, seems to be by a combination of propeller and Francis turbines, the cheaper propeller units being in the majority and operated at or near rated loads most of the time, the Francis

units serving as auxiliaries for peak loads where their relatively high part gate efficiencies would be of benefit. (9)

The foregoing discussion would also apply in general to a low head plant where Kaplan turbines were used instead of the Francis type. Kaplan turbines, like Francis type installations are more expensive than ordinary propeller units, and so the principle of supplementing the ordinary propeller units in the plant by a number of Kaplan turbines would involve roughly the same considerations as outlined above. Whether Francis or Kaplan turbines should be used for this purpose, will depend largely on attending circumstances. The relative advantages of each have been outlined under a previous topic, and each type has its field in this respect.

In concluding, it may be remarked that the advent of the high specific speed runner, to meet the demands of the low head field, has given rise to many new problems, a good example of which is the increased importance of an efficient draft tube for low heads. Therefore the design of low head turbine installations is undergoing a period of rapid progress, to such a marked extent that details and methods are changing constantly. This is especially true of Kaplan turbine, with its blade-shifting mechanism. The introduction of this type of turbine on the American continent will no doubt be a large step in the progress of turbine practice here, and will probably play some part in the development of Canada's low head water power resources. Solutions have been brought forward for problems of variable head, and changing load, but there are still difficulties unsolved, and new ones will arise, which will provide material for research as they crop up. In illustrating the economic importance of the propeller type turbine in the field of water power, a parallel might be drawn with the internal combustion engine in the field of Thermodynamics. One of the factors in the development of the internal combustion engine was the evident depletion of the coal resources of the world. So also, a time has arrived in the water power field when the high head resources in the more settled and industrial parts, are fairly well developed, and to meet the increasing demand for power, attention must be turned to the low head resources.

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# Gas Welding in the Structural and Piping Fields

By D. S. Lloyd*

## PART 1—*Welding Structural Steel.*

As far as welding is concerned, structural steel falls into the low-carbon classification and every welder is familiar with this class of work. The welding of low-carbon steel is the most generally used application of gas welding and has been for years. Applying gas welding to structural steel, therefore, is merely extending the use of this method on a class of metal which is already well known.

Completing Oxwelding Steel Framework

The use of welding on structural steel has been a subject of much interest for some years—not so much from the standpoint of whether or not sound, reliable welds can be made in this material as this has been already proven, but because in the design, supervision and erection of welded structures, problems have been presented which require some study on the part of the engineer. In order to take full advantage of the economics which can be effected in using welding, the designer must know the principles of

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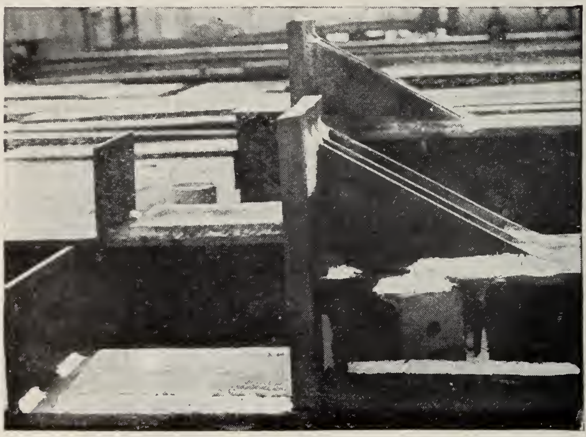
A summary of an address given before the Engineering Society of the University of Toronto, February 11th, 1930, accompanied by motion pictures of the welding of a 300-ton Mill Type building and the welding of steel and wrought iron piping.

applying welding and the details of erection which are affected by welded design.

### Procedure Control

The factors which are considered, consciously or unconsciously, in any type of construction, and which should be considered in detail when welding is to be used, are usually listed by the welding engineer under the title of Procedure Control, which embraces the following:

(a) Design.
(b) Selection of Material.
(c) Selection and Training of Personnel.
(d) Preparation of Material.
(e) Welding Technique.
(f) Finishing and Testing.



Detail of Welded Crane Girder Seat

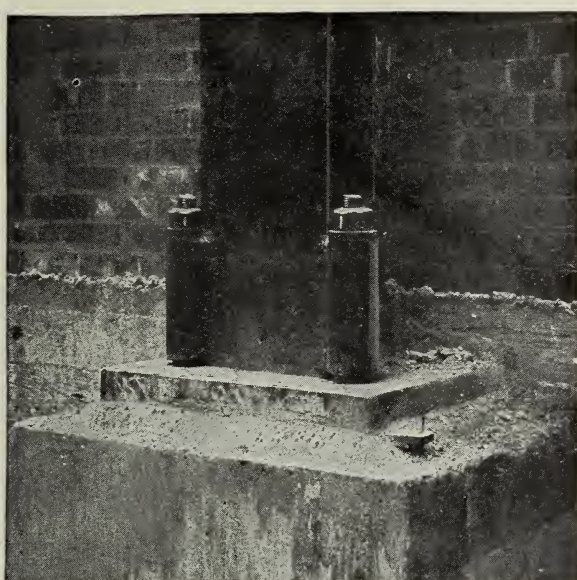
As mentioned before, the problem of welding low-carbon steel is a simple one to the welding engineer and the factors, (b), (c), (d) and (e), above, can be readily worked out. Welding rods, developing in the finished weld properties closely approaching or better than those of the base metal, have been in use for years. The average welder is already familiar with this type of welding, and can be readily tested and qualified for work of this kind. Facilities for preparing and setting up of work preparatory to welding are available and the exact technique of welding this metal is a recognized standard.

Finishing and testing of welds in structural steel present, in general, no problems of importance providing the first five factors have been considered and the work properly done.

## Design and Erection of 300-Ton Mill Type Building

Rather than attempt to generalize on the interesting details of design and erection, consideration of the welding of 300-Ton Mill Type building will probably bring out interesting points in connection with these factors in buildings with welded joints.

In general, the designs for welding were characteristic of the lap method of assembly utilizing the fillet type of weld. Exceptions were made at the heel and ridge connection details, where a combination of fillet and butt welding was utilized and in anchorage details for all principal columns.



Anchor Bolt detail consisting of short lengths of pipe welded to each flange of the column.

These anchorage connections are typical of the advantages which welded construction offers in many instances. Instead of rivetting clips to the *H* sections at the base of the columns, to receive the anchoring bolts, short lengths of pipe were welded to each flange of the columns.

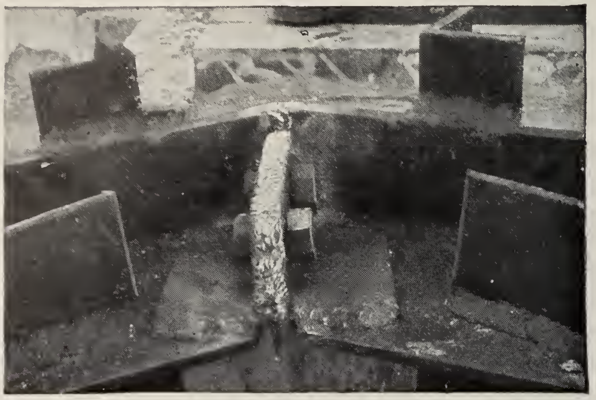
Erection was accomplished by bolting, clips being welded to the sections as required during shop fabrication.

## Code for Fusion Welding and Gas Cutting in Building Construction*

The specifications for general design observed the requirements of the building code of Niagara Falls, whereas the welded design

*Part A—Structural Steel—American Welding Society.

conforms to the recommendations of the Structural Welding Code of the American Welding Society. This allows a unit tensile stress for weld metal design of 11,300 lbs. per sq. in. for shear, 13,000 for tension and 15,000 for compression through the throat of fillet and butt welds.



Completed Welded Truss Ridge Connection. Note assembly bolts still in place.

Shop Fabrication. Welding crane girder knee brace.

## Cost

The structure to which reference is made, was the first gas-welded building of major size. Had advantage been taken of all the experience gained on this job, it is estimated that the shop welding cost should not average more than $20 per net ton of shop welded steel or $13.70 per ton on the basis of total job tonnage.

This cost will be offset by an amount representing the erected cost of the steel saved by welding instead of rivetting. The saving in weight in a structure like this is at least 10 per cent. It is expected that the field erection cost for a welded structure of this type will be about the same as for rivetted construction.

Welding floor framing in mezzanine section.

Truss lower chord splice welded in field.

## General

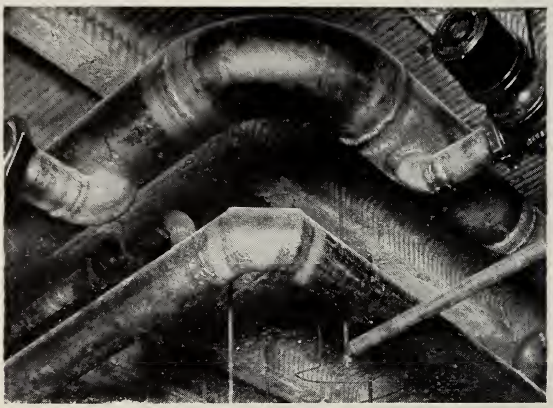
The feasibility of welding structural steel was soon realized following the preliminary experiments and early application to

*Author's Note*—The motion pictures covering the details of this job contain information and data which can be only briefly referred to in this summary. Complete description and illustrations of the work are contained in a reprint of two articles which appeared in the Dec. 12th and 19th, 1929, issues of *Engineering News-Record,* by H. H. Moss and H. M. Priest.

small buildings. The progress has been rapid, until to-day there are at least 100 important structures completely welded.

The work of the Structural Welding Committee of the American Welding Society was undertaken to obtain a cross section of the value of welding in the hands of the steel fabricator from the standpoint of strength and ductility of joints and the ability of the fabricator to follow definite welding specifications.

The Structural Welding Code mentioned above was prepared by the American Welding Society to provide proper regulatory data which a building department could use to incorporate in the city codes when the demand for such information presented itself.



Oxwelded elbows and risers.

The welding of structural steel with its elimination of noise, flexibility of design and stronger joints allowing reduction in weight, has become an all-important subject to the structural man and warrants a great deal of study and thought on his part, that it may gradually be taken into the field as an improved reliable method of jointing.

## PART II—*Welding Steel and Wrought Iron Piping.*

Although for many years it has been standard practice in the gas and oil fields to oxweld joints and fabricate fittings for distribution lines, it is only in the last few years that this method of jointing has come into prominence in Canada in the field of piping for industrial buildings.

The oxwelded joint is permanently leakproof; stronger than the screw-coupled or flanged joint; in most cases lower in cost; and a welded line makes it easier to make alterations in the systems, but in most cases the steamfitter and contractor have not been familiar with the application of welding to piping work, and there-

fore have been very slow in accepting the oxy-acetylene unit as a tool for this industry.

## Design

In designing a piping system for welding, the first economy is effected in the draughting room as the welded line can be laid out much more easily, estimates of fittings are practically eliminated, any type of joint at any angle can be made by welding without making it necessary to comply with fitting standards. The result is that the piping designer has a much more flexible method of fabrication under his control.

## Selection of Material

Although Norway Iron welding rod, giving a strength in deposited weld metal of from 45,000 to 50,000 lbs. per sq. in., has been in use for years in welding pipe joints and is quite satisfactory, the advent of high test welding rod, giving a strength in deposited weld metal of from 55,000 to 65,000 lbs. per sq. in., has raised the strength standard of pipe joints and has put in the hands of the pipe welder a rod more adaptable to the welding of pipe joints in position. High test rod also has the very advantageous property of causing a slag to form during the welding, thereby cleansing the molten metal of impurities. It has also been found on repeated tests, that welding can be accomplished faster with the high test rod, thus eliminating the factor of cost, since it is a little more expensive than low-carbon iron rod.

Almost all commercial steel and wrought iron pipe is of very good welding quality and standard specifications for this material will usually suffice. A simple test for welding quality can be easily applied.

## Selection and Training of Personnel

Pipe welding is a field in itself and it is seldom that a knowledge of welding other than steel and wrought iron piping is required of the pipe welder. It is, of course, necessary that the welder be able to make a sound, leakproof weld with full penetration to insure the proper strength in the joint, in any position, since many welds must be made on pipe which cannot be turned. "Overhead" welding, as it is usually called, is more difficult than when the pipe can be rolled. However, the training required for welding pipe, both on the ground and in position, is a known quantity, and most men can in a few weeks be instructed to do fair pipe welding and with a year's or more experience, should be classed as good pipe welders.

## Preparation of Material for Welding

Steel piping can be obtained from the mills bevelled for welding and in most cases a reduction in the cost of the pipe can be obtained as compared to the price when threaded and supplied with couplings.

The random length being quite as acceptable on a welded job as standard lengths would be when flanges or couplings were used, a further saving can be made by the pipe manufacturer in having no waste. The cutting blowpipe will permit the welder to cut pipe to any length or shape and allow him to bevel the ends of the pipe preparatory to welding. Templets for special joints and connections are made and supplied the welder as required and these are as simple to make as those of the tinsmith.

## Welding Technique

This is not the place to describe in detail the technique of the welder, even in so far as it applies to the welding of pipe. Sufficient to say that handbooks are available which describe completely the proper methods of handling the blowpipes and insuring the utmost economy in speed and gas consumption.

Oxwelded header for steam heating system.

Oxwelded joints allow more compact installation.

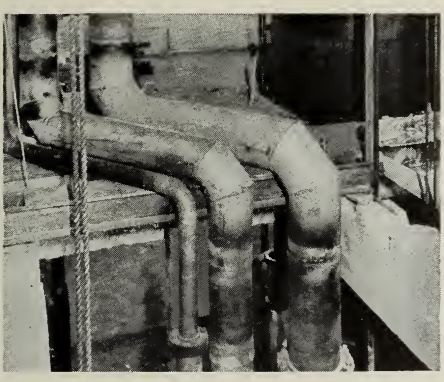
## Finishing and Testing

Except in very occasional instances, finishing of a weld is not required on pipe work but in case a particularly smooth surface is required, it is easily obtained, since the weld metal is easily machinable. The testing of welded pipe lines presents no problems to the piping engineers, as the joints will stand any test which would be put to an installation on which other types of construction might be used.

## General

More piping contractors every day are adding welding to the means of fabrication of joints and fittings at their disposal and are training their men in the use of the blowpipe. The steamfitters unions, realizing the importance of having their men familiar with this new type of joining, have organized classes in welding, with the help of the manufacturers of compressed gases, and are in this manner making available to the contractor a supply of trained pipe welders which will enable him to adopt this type of joint.

Oxwelded double turn in steel pipe line.



Welded mitre bends fabricated on the job.

The advantage of having the steamfitter capable of doing the pipe welding is obvious. To have a welder following a crew of steamfitters, who confine their work to placing the hangars, stringing the pipe and placing valves, etc., causes loss of time and increases in labor cost, besides disrupting the organization of the contractor's crews.

A few examples of installations where welded joints have been used are the Sun Life Building in Montreal, Royal York Hotel,

Toronto, new plant of the American Can Company at Simcoe, T.H. & B. Roundhouse at Hamilton, Chrysler plant at Windsor, additions to the plant of the Shawinigan Chemicals Limited, Shawinigan Falls, P.Q., new building for McKinnon Industries at St. Catherines, and hundreds of other installations are being designed and installed at the present time.

# Development in Hydraulic Turbines

By Robert W. Angus,
*Professor of Mechanical Engineering.*

The use of the water turbine to produce power on any large scale began probably not over forty years ago, so that the present generation has seen much of the development of this useful machine. Amongst the earliest plants were those at Niagara Falls, where power had long been made on a modest scale, and with relatively small units, to drive the mills located along the river, but these plants only used a small part of the total head, and delivered water through tunnels opening into the side of the chasm many feet above the lower river. The discharge from these was a picturesque example of how useful energy may be wasted.

When, therefore, a plan was proposed to use practically the entire difference of heights at the Falls themselves, *i..e,* to use approximately 135 ft. of the 155 ft. available, it created considerable interest and the promoters of the scheme had great difficulty in convincing investors that such a scheme, involving turbines of 5,000 H.P., was at all feasible, or could be made profitable. The early turbines consisted of units with two 2,500 H.P. wheels on the same vertical shaft, these being of the Fourneyron, or outward flow type, and as draft tubes could not be used on them they had to discharge well above the tail water, and a tunnel had to carry the rejected water about 1.4 miles before it reached the lower river. This development was a great step forward in the way of large power plants and was the product of a committee of the very best men in the world.

To-day the old plant is exhibited as a relic, there are no tunnels discharging water high up the cliff and the size of units has increased from 2,500 H.P. per runner to 70,000 H.P. per runner and there is no evidence that progress is over. The turbines are working under the full available head of about 214 ft. on the American side and 180 ft. at the Ontario Power Co., Canada, the full available drop at the Falls and upper rapids, and the Ontario Hydro-Electric Power Commission is using over 300 ft., the full available difference between the lake levels.

As the demand for power has increased the turbine builders have continued their efforts till now they are willing and able to meet practically any conditions imposed. The early large turbines used in Canada came from Germany and Italy for the Ontario Power Co., and the Cataract Power Co., at De Cew's Falls, respectively, and later turbines for the latter company from Germany, but now practically everything used in Canada or the United States is made in America. To enable them to meet the great and variable demands the manufacturers in America have installed testing flumes of their own, where they can try out all new ideas and make sure

of their probable success before they are put into large sizes. The turbines tested are models of the larger ones, and the laws of hydraulic similarity have been most carefully studied, so that the connection between the tested model and the full sized wheel is known. For example, these flumes ordinarily take Francis wheels not over 16 in. dia. and test them under about 10 ft. head, and from this test it is quite easy to predict the performance of a similar turbine say 12 ft. dia. when working under 300 ft. head, or any other conditions. For the Pelton wheels similar tests are carried out.

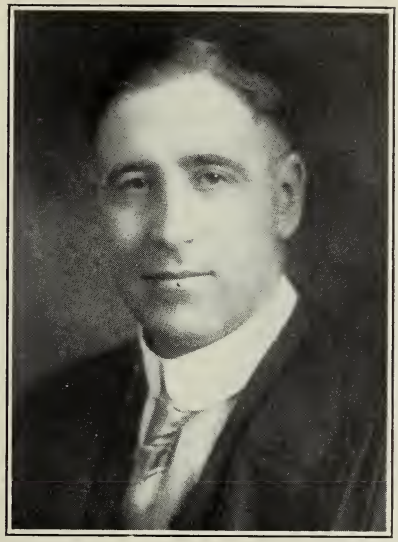
The greatest developments of recent years, outside the large size of unit that is being produced, is the larger range of heads to which the Francis turbine has been adapted. Such turbines are now made for heads up to 900 ft., as is the case of the 35,000 H.P. unit operating near Portland, Oregon, under this condition, and the wheel is small, with low specific speed, the main trouble being, naturally, to avoid leakage around the runner. Low head turbines have undergone the greatest changes of any, for of late years the number of plants working under these conditions has been growing fast.

The main objection to the low head development was that the speed of rotation of the available turbines was so low that the cost became excessive, and hence to meet the demand, the Francis runner blades were cut further and further back until they became almost radial, the flow through them being practically parallel with the shaft. This eventually resulted in the propeller turbine, with a runner resembling the propeller of a boat so closely that one has sometimes to look very closely to decide which is which. These turbines rotate at about twice the speed of the Francis turbine and have excellent efficiencies at full load, but unfortunately at low loads their action is not so good and at half load they only do a little better than 65% of the efficiency at full load.

To get over this defect the Kaplan turbine has been made, in which the propeller blades shift with the load at the same time as the distributor blades, but at a much slower rate. There is thus a special setting of both distributor and runner guides for each load and the resulting improvement in efficiency is very marked. Turbines of this type have shown, on test, efficiencies exceeding 91% from 40% to 100% full load, and of 85% with 30% overload; results quite close to those of the best Francis turbines. Many Kaplan turbines have been installed in Europe and a number are going in in America.

In impulse turbines of the Pelton type a great deal of attention has been given to the large powers, and turbines of over 40,000 H.P. are now in use. The vertical impulse turbine is also an interesting development, and four nozzles have been used on a vertical turbine by Vickers, and another one recently built by Tosi in Legnano, Italy, has five nozzles on a single runner.

Progress of turbine development will continue for years to come and we are still in the early stages.



PROFESSOR E. A. ALLCUT

# Oil Engine Research at the University of Toronto

By B. M. MacKay

For several years Prof. Allcut of the Department of Mechanical Engineering at the University of Toronto, has carried on extensive research work in internal combustion. Convinced that the two-stroke cycle is destined to become far more important commercially than it now is, Prof. Allcut has done considerable work on this type of engine. The results of his work were published in May, 1927, in the Proceedings of the Institute of Mechanical Engineers, in the paper "Further Tests on a Two-Stroke Cycle Oil Engine"—and for this paper Prof. Allcut has been awarded the Herbert Akroyd Stewart Prize, which is given every three years by the Institute of Mechanical Engineers, London. This is the first time that the prize has been awarded outside of Great Britain.

The tests, which were performed on a standard Allen two-stroke cycle, vertical, heavy-oil engine, having hot-bulb ignition and crank-case compression, are described in detail in Bulletins 6 and 7 of the School of Engineering Research. Only a brief summary, therefore, will be given here.

The experiments referred to in the paper were designed to throw light on the functioning of the two-stroke cycle, special attention being paid to the exhaust and charging periods. In a two-stroke engine this part of the cycle replaces the exhaust and charging strokes of the four-stroke cycle, and therefore the whole functioning of the engine is controlled by it.

Changes of pressure during the cycle were recorded by Crosby gas-engine indicators connected to the cylinder and crank-case respectively. To enable a more careful study of the pressure changes to be made, two other indicators of the balanced diaphragm type were connected to the cylinder and exhaust pipe respectively. The results obtained from the two types of indicator agreed very well.

It was found that the chemical composition of samples of exhaust obtained by the usual method differed materially from those calculated from the quantities of air and oil put into the cylinder. A sampling valve, timed to open at any desired point in the cycle, was, therefore, inserted in the exhaust pipe, as close as possible to the exhaust ports. By means of this valve, which opened and closed in .0066 sec., it was possible to find out what changes in the composition of exhaust gas were taking place during the cycle.

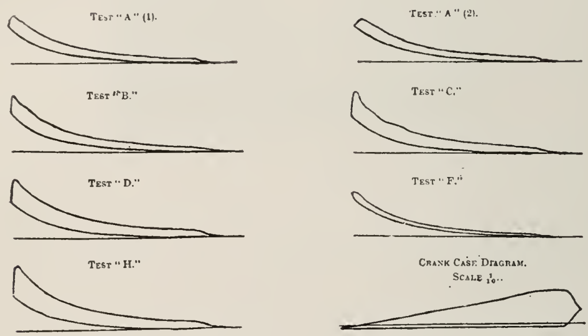



Fig. 1

A thermometer was inserted in the crank-case to give the mean temperature of the scavenging air, and the temperature of the exhaust gases was measured with a chromel-copel thermocouple placed in the exhaust pipe. The cooling-water losses were found by weighing the water and observing the inlet and outlet temperatures, the latter being kept, in all cases, as nearly as possible at 135 deg. F. The fuel used was a light fuel-oil, having a specific gravity of 0.849 at 74.8 deg. F. Its calorific value, obtained both with a Parr calorimeter and an Allcut calorimeter, was 19,850 B.T.U. per lb., higher value, and 18,715 B.T.U. per lb., lower value. It contained 84.45% carbon and 13.01% hydrogen, and its flash and flame points were respectively, 186 and 202 deg. F.

Representative indicator diagrams are shown in Fig. 1. The maximum explosion pressures for the various loads range from 164 lbs. per sq. in. at 13.27 B.H.P. for test A, to 235 lbs. per sq. in. at 22.74 B.H.P. for test E, but the compression lines are the same for all loads.

The light-spring diagrams for the cylinder and exhaust pipe, when laid out on a crank angle base, show that the fluctuations of pressure synchronize almost exactly, falling to a minimum at 150

deg. crank angle, rising above atmospheric pressure to a maximum of 1.5 to 2 lbs. per sq. in. at about 175 deg., falling below atmospheric again and finally reaching atmospheric pressure at 240 deg., at which point compression begins. Although the inlet ports open at 137 deg. the flow of air into the cylinder is not sufficient to counteract the rapid fall of pressure until the piston begins to slow down at a crank angle of about 150 deg. The air pressure in the crank-case then begins to fall. There is, however, a period of about 10 deg. near the end of the stroke where the pressure of gas on the piston is equal to, and sometimes slightly exceeds the air pressure, and it is probable that during this period very little air enters the cylinder, and the time of effective scavenging is thus reduced. The diagrams for all tests have similar characteristics and indicate that during the high pressure period, around 180 deg., there is no "blow-back" of exhaust products into the crank case.

The value of n in the equation $PV^n =$ constant for the working strokes varied from 1.04 to 1.13, a low figure, suggesting that combustion continued until late in the expansion stroke. This was verified later by plotting characteristic diagrams on a temperature-entropy basis, from which it was evident that combustion was not complete in most cases until the piston had covered 60% of the downward stroke. This result suggests late injection, but prior to these tests, the injection had been advanced until the combustion at heavy loads was practically at constant volume.

In calculating exhaust losses, allowance was made for the heat lost in kinetic energy, due to the exhaust gas expanding adiabatically through the ports after release. This loss was found to be of the order of 3 to 8%.

In addition to the individual exhaust gas analyses obtained at different crank angles, average samples of gas over the whole cycle were collected by holding the sampling valve open by hand while the engine was running. The extent of the error involved when samples are taken in this way was found to be 30 to 40%. During the time when the exhaust ports are closed, from the 240 to the 100 deg. angle, there is no gas leaving the cylinder, but merely an oscillation in the exhaust pipe and a probable dilution with air, so that the true composition of the exhaust gas is given approximately by the mean height, between 100 and 240 deg., of the curve of per cent $CO_2$ plotted on crank angle.

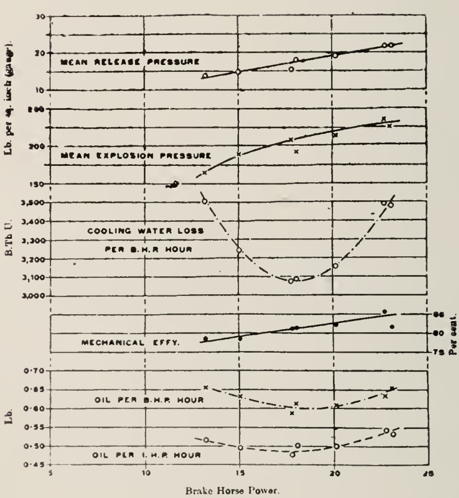
Prof. Allcut points out that if the active exhaust period equals or exceeds 120 deg. the idle period disappears when the engine has three or more cylinders, but the velocity corrections will continue to affect the result until the number of cylinders is increased to such an extent that the exhaust periods overlap very considerably.

The efficiency of scavenging and the determination of the quantity of air remaining in the cylinder of a two-stroke cycle engine are difficult to obtain, but these factors are important, as the amount of fuel which can be consumed, and therefore the mean effective pressure obtainable, depends on the amount of air avail-

able. Assuming that the analysis which gave the maximum percentage of $CO_2$ in each test represented nearly the composition of the expanding charge, the weight of charge was calculated. The results showed that with proper admixture of air and fuel a considerably greater quantity of the latter could be burned and the power materially increased.

These calculations also enabled the temperatures of the cycle to be determined approximately with the aid of a special internal energy-entropy diagram drawn for the purpose. In the first tests the compression temperature ranged from 710 to 780 deg. F., the maximum cylinder temperature from 1,350 to 1,725 deg. F., and release temperature from 960 to 1,375 deg. F. From the entropy diagrams the maximum temperature is found to occur when the piston has traversed 8% of the power stroke, and this fact, together with the considerable amount of after-burning that exists, and the weakness of the charge, accounts for the comparatively low combustion temperatures obtained.

The performance curves plotted from the test results for various loads are given below:



# Solving the Problems of Aviation in Canada

J. H. Parkin, M.E., F.R.Ae.S.

Probably in no other country is commercial aviation making or is possible of making such a contribution to progress as in Canada. Settlement and development of the Dominion first followed the waterways, later the railways and may now be said to be following the airways. Regions formerly regarded as inaccessible and otherwise doomed to remain forever undeveloped are now not only being explored, but are actually in process of development practically wholly by means of aircraft.

Aircraft are being put to a variety of useful and practical tasks known in no other country. Having these facts in mind and having before them the specific problems of aviation demanding solution, many of them peculiar to Canada, the National Research Council, in collaboration with the department of government directing commercial aviation, has commenced the construction of National Aeronautical Research Laboratories at Ottawa. A function of the laboratories will be to test the airworthiness of aircraft engines manufactured in Canada which until the present time it has been impossible to do because no equipment was available. With the development of a Canadian export trade in engines, the necessity of the National Research Council undertaking this rating function in accordance with regulations already adopted had become urgent.

In buildings that might almost have been constructed originally for that very purpose but which before their purchase some time ago by the Dominion Government housed the Edwards mill on Sussex Street, work is now well advanced on—

(1) A wind tunnel for aerodynamic research and testing, 9 feet in diameter, in which a 13 foot propeller will develop an air speed of over 125 miles per hour;

(2) A towing tank 400 feet long, 8 feet wide and 6 feet deep for the testing of aeroplane floats, hulls and other high speed craft;

(3) Complete engine testing plant capable of accommodating aircraft engines of any type and of absorbing powers up to 1,000 horsepower at speeds up to 2,500 revolutions per minute.

The success with which aircraft have been used in Canada is remarkable when it is remembered that the operations were in many cases commenced using military types and that even now few of the aircraft are specially designed for the service and conditions under which they are operating. The success of the few machines designed for specific purposes indicates what can be accomplished. To make fullest use of aircraft in this country, machines suited to Canadian requirements and conditions must be developed. In developing aircraft suited to the special services and peculiar conditions an aeronautical laboratory is essential. It was in recognition of this fact and the national importance of aviation that the Re-

search Council, with the approval of the Sub-Committee of the Privy Council on Scientific and Industrial Research has undertaken the establishment of the completely equipped laboratories at Ottawa. The laboratories planned will compare favorably in extent and capacity with the best in other countries.

Work in the laboratories will be principally aeronautical research for the purpose of improving performance of aircraft, developing new types and solving problems arising in connection with the design, construction and operation of aircraft in Canada. Aeronautical testing will also be undertaken for designers, constructors and operators and the laboratories will be found very useful for many investigations of a non-aeronautical character.

Not the least important work of the laboratories will be the facilities offered for training in aeronautical research. The knowledge gained by young men in one or two years of research will be of material benefit not only to them but to the Canadian aircraft industry and aviation.

Although a small tunnel was used by W. R. Turnbull, of Rothesay, N.B., for experiments on wind sections as early as 1902 when aviation was in its very infancy, only one tunnel is in existence in Canada at the present, that of the University of Toronto which was installed in 1917. It is four feet square while tunnels now in favor range from 8 to 10 feet in diameter.

The use of the wind tunnel in aerodynamics is based on the principle of relative motion. Instead of moving a model through still air, the air is moved past a stationary model. Under these circumstances the reactions on the model are the same as though it were in motion and the difficulty of properly supporting a moving model is avoided. From the measurements possible the performance or characteristics of the full scale machine in free flight can be accurately predicted at much less cost, in less time and without the inconvenience, difficulties and hazards of free flight testing, while in addition, the exact conditions can be readily duplicated.

In the National Research wind tunnel there will be a 13 ft. diameter propeller driven by a 600 horsepower motor which it is anticipated will develop a maximum air speed in the jet of over 125 miles per hour. The tunnel will permit aeroplane models of span up to 5 feet to be tested at a speed of 125 miles per hour.

Power is to be supplied to the laboratories from the hydro plant on the site of the National Research Laboratories which develops the power of the Rideau Falls.

Because of the large water areas present in most sections of Canada, aircraft of the flying boat type or equipped with floats are much used in Canada. There is perhaps a larger proportion of marine craft used in Canada than in any other country. The improvement of this type is therefore of great and immediate importance to the Dominion.

Efforts made up to the present time to develop new types of

marine aircraft for special services have been seriously handicapped by the complete lack of experimental facilities in the country. The National Research Council realizing the need of such facilities, is providing a suitable experimental and research laboratory. The water tank now under construction will be the only one in Canada and will be invaluable in improving the water performance of aircraft floats and hulls.

In marine practice the towing basin or test tank has proved of inestimable value to the naval architect and ship builder. No important vessel is now built without first making model trials in a test tank. By so doing not only is the performance much improved but in many cases failure to attain the anticipated performance is prevented. Most recent developments have been the result of systematic work in test tanks.

In spite of the handicaps involved a great deal of aeronautical testing is done in the ship tanks. A few tanks of small size, built for aircraft work, are in successful operation and larger ones are projected, if not already under construction.

In a test tank, unlike a wind tunnel, the model, attached to a dynamometer or balance carried on a towing carriage, is drawn through still water. As in the wind tunnel the test conditions are made as nearly ideal as possible, largely because of the difficulty of adequately defining any other conditions. Hence the water in the tank is perfectly still, free from waves, surface dust and floating matter, mechanical equipment being installed to assure that condition.

Of the length which the water tank is being built, 150 feet will be used for acceleration, 150 feet for the constant speed run and 100 feet for deceleration. The eight ft. beam of the tank will permit the testing of models four feet long. Distances will be recorded electrically through accurately spaced contacts along the rail. Time will be electrically recorded by an accurate chronometer on shore. These two records will enable the velocity to be determined with precision.

There are now in Canada three firms assembling aircraft engines primarily to supply the Canadian demand, but already Canadian assembled engines are being exported. Under Air Regulations 1920, the Dominion Government is required to carry out tests to establish the airworthiness of aircraft engines for export. At the present time there is no equipment in this country for the purpose. The testing of engines for this purpose is very properly a function of the National Research Council. The equipment being installed in the Laboratories due to its flexibility and range will enable much research to be carried on in connection with internal combustion engines. Being the only equipment of its type and size in the country, investigations of a character not otherwise possible, may be made.

The equipment will be unique in that provision is made for applying thrusts to the crankshaft corresponding to propeller thrusts up to 6,000 pounds.

For testing air-cooled engines a large centrifugal fan, driven by a 250 horse power motor, will discharge a blast of air through a cylindrical duct and adjustable nozzle past the engine cylinders.

The aeronautical laboratories will satisfy a national need. The aeronautical researches rendered possible and the training afforded young men by the laboratories will do much to improve Canadian aircraft and extend their usefulness.

*By permission of the Canadian Manufacturers' Association.*

# A Graduate Writes From Germany

"Graduates come back and speak wise things to you, and they did to me. They write things that show you that Life's not one wild whoop after graduating. But these are aged persons, who having had their little fun, have already forgotten it. Let me, who agree not at all with the aged and wise, come back in this way and say a few words. To be perfectly truthful, I am earning damn little, but I am Living! Got over here, which is very far from anywhere I had thought about, by using both the w.k. hook and crook. How to get back, if I ever do, is yet to be thought of. You won't believe it, but I work in a place where men work (as all men work) over petty details (bloody little rivets and chunks of dural, dirty iron, the dazzling weld-arc) and yet are enthralled at the result of it all. You would be also, if you saw a lithe thing, silver and black in the sun, leap skyward, howling, or a monstrous mass of glittering metal, heave itself off the ground and do the impossible things it was meant to do; or a roaring bit of metal, day in and day out on the test-bench, telling the world and proving it, that a horse weighs less than two pounds. A machinist in a car or implement factory makes common things that cannot thrill. But here, these Junkers-Men gaze upwards and point proudly and say: 'I built the so-and-so (always an impossible word) on that machine.'

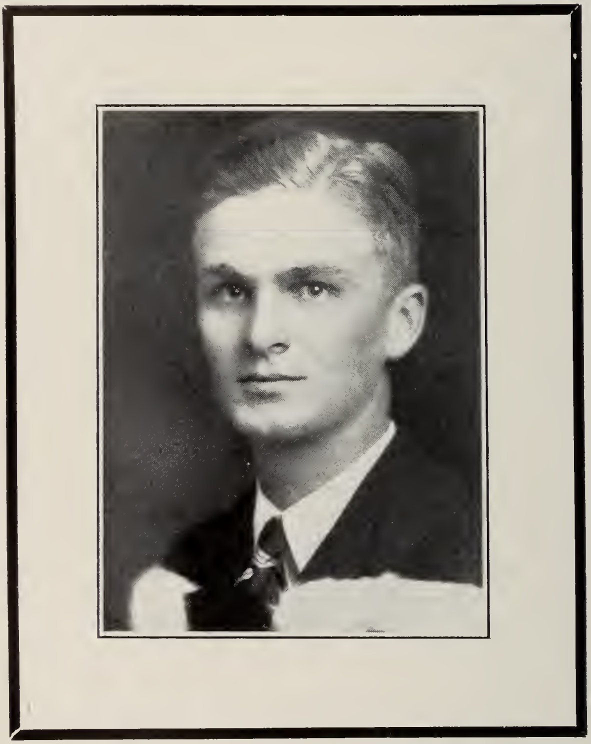
If, after graduating, all you people think it is best to tear around after a job, then *stick* there, you can damn well go and do it. But on the other hand, why not roll a bit? Why not look around you? Why not take a stab at something ridiculous, in an unheard-of place and go there and do it? You won't make any money, but if you wait till you have made money, you're too old to do anything you might have wanted to do. There are thousands of reasons for staying near home, but as I don't know how to argue, all I can say is that there are one or two reasons for going about. To be perfectly impractical, as one must be, why not scatter our iron rings about the world and show the said world that Canada is a place where more is than COLD?"

There it ends. It is, of course, just some more of the well-known waste product that we speak of so familiarly and often. But it is the only kind of thing I can write, so there!

Sincerely, and best wishes,

B. S. Shenstone, 2T8.

c/o Junkers Flugzeugwerke,
Dessau, Anhalt, Germany,
November 27, 1929.



# Flying Officer Paul Garton Stanley

On Monday, November 4th, 1929, Garton Stanley, a graduate of this Faculty, of 1927, met his tragic death in an airplane crash near the city of Montreal. He was engaged at the time in a test flight for the Canadian Government and, accompanied by another officer acting as inspector, was attempting an altitude test in a Canadian Vickers "Vedette" seaplane. The speed trials had been successfully carried out on the previous Saturday, but the final flight to determine the "ceiling" had been postponed due to unsettled weather. It was decided on Monday afternoon that weather conditions were favourable and the machine was taken up accordingly.

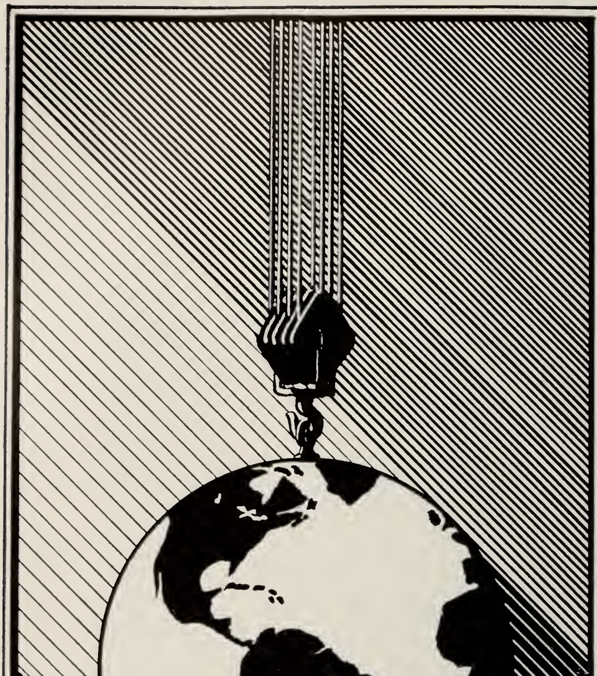
The only evidence available concerning the flight was found in the barograph record which was recovered from the wrecked plane. This showed that the machine had climbed steadily to a height of 17,000 feet and then had started down. At 10,000 feet the record ceased and it is thought that storm clouds were encountered, throwing the machine out of control. The plane crashed into a field at Sault aux Recollets, on the Back River, and both officers were killed instantly.

Born in Toronto on April 2nd, 1906, Garton was educated in local schools and entered the University in the fall of 1923 to study Mechanical Engineering. Graduating with very high honours, he returned to the University teaching staff the next year as a demonstrator in Machine Design. During the period following graduation, he had evinced a keen interest in aeronautics and had assisted in research work in the Wind Tunnel Laboratory. It was natural, therefore, that in the spring of 1928, he should enter the Royal Canadian Air Force to take the student course at Camp Borden.

He was appointed a Pilot Officer in July and was sent to the Esquimault Naval Base on Vancouver Island to complete his training in seaplane work. Promoted to Flying Officer a year later, he was transferred to the Ottawa Air Station to carry out experimental and test flights for the Department of National Defense. It was on one of a number of periodical trips to Montreal to perform acceptance tests for the Government, that he met his untimely end.

The members of his year and all who were associated with him at any time held him in high esteem. Quiet and reserved, he was greatly loved by those who knew him most intimately and it was these qualities along with a distinguished academic record and an unassuming strength of character and mind, that had opened the way to a promising future. He was happy in his work and his military record was characteristically clean and high in standard. To his closest friends the Air Force motto brings a deeply significant meaning, in that he should reach his goal under its symbolic words, "Per Ardua ad Astra".

R. B. Rochester



# ENGINEERS

THE

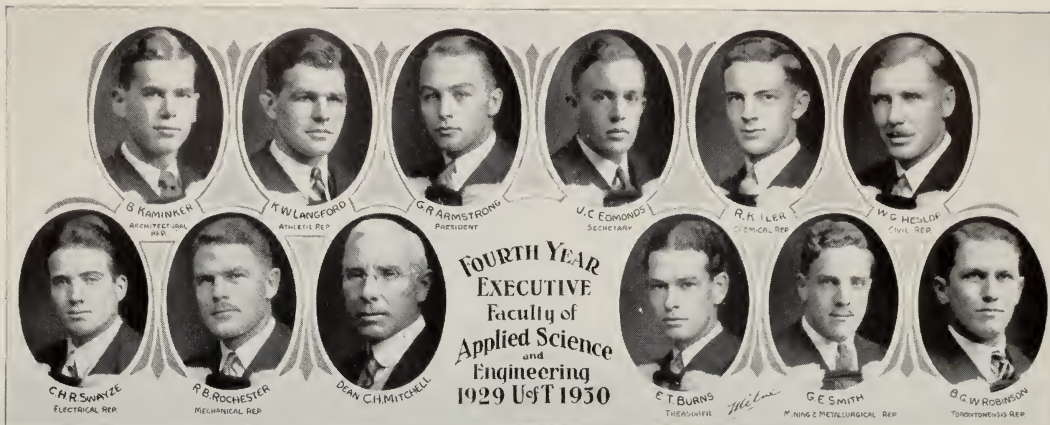
# YEAR BOOK

*of the*

# University of Toronto Engineering Society

Faculty of Applied Science

1930


FOURTH YEAR
EXECUTIVE
Faculty of
Applied Science
and
Engineering
1929 U of T 1930
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ARCHITECTURAL REP.
K. W. LANGFORD
ATHLETIC REP.
G. R. ARMSTRONG
PRESIDENT
J. C. EDMONDS
SECRETARY
R. K. ILER
CHEMICAL REP.
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C. H. R. SWAYZE
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R. B. ROCHESTER
MECHANICAL REP.
DEAN C. H. MITCHELL
E. T. BURNS
TREASURER
G. E. SMITH
MINING & METALLURGICAL REP.
B. G. W. ROBINSON
TORONTONENSIS REP.

# *Engineering Society Elections*

Several days prior to Friday, March 7, an unsuspecting character became cognizant of the fact that all was not normal around the "Little Red School House". He found himself the recipient of friendly smiles from hitherto unknown colleagues, familiar claps on the back, and handshakings became a common occurrence, and at last he surmised (poor disillusioned fellow), he was entering the circles of the great "Joe College". After a day or so of this short-lived bliss, the haze lifted. This, that and the other fellow cornered him and whispered in his ear confidentially, "I am running for office and would greatly appreciate your vote". Not till then did he realize the great politicians of "School" were at work, and that the famous Engineering Society Elections were about to take place.

The elections this year were exceedingly meek and mild, due mainly to the efficiency of our illustrious police force. The Medical fence received no paint, neither did the cannons roar forth the fact that the School Elections were on. A body of Sophomores realizing the terrible state of affairs, attended a large arts lecture and succeeded in getting a very poor write-up in "The Varsity".

Following out the old Science custom, luncheon was held in the Great Hall, after which the electoral body retired to the East Common Room. Here a rather informal meeting or get-together was held, which served the purpose of instilling a little more School spirit into the happy gathering. After many beautiful and touching ballads had been sung and several inspiring stories had been related, the voters became anxious to exercise their franchise. Consequently the engineers of S.P.S. wended their peaceful and innocent way toward their respective polling booths.

At these elections there was more bribery than in the past, and the wise voter, that is the one who consults the candidates two or three times before casting his vote, found he had a supply of delicacies which lasted till nearly the last act of the matinee. For after having voted, it is an unwritten law that each and everyone shall relax after the mental strain of voting in some downtown theatre, thereby preparing himself for the evening frolics.

The scene next shifted to the second year drafting room. It is here that the results are flashed on the wall, enlightening all those fortunate enough to be able to decipher them. It is here the days of Ben Hur are recalled and many feats of strength and skill are performed which thrill and mystify the interested spectators. To safeguard against starvation, sandwiches, apples and cider were served *à la carte*. Then with the announcement of the final results, the drafting room once more became a drafting room, the elections were a thing of the past, and the exams were a thing of the future.

I. K. CHALMERS,
*Secretary.*

# *Election Results*

## ENGINEERING SOCIETY

*President* ........................................ A. E. Tyson
*First Vice-President* ........................................ W. L. Dutton
*Second Vice-President* ........................................ E. S. Jewett
*Secretary* ........................................ M. A. Elson
*Treasurer* ........................................ J. L. Donaldson

## ATHLETIC ASSOCIATION

*President* ........................................ T. A. Hancock

## STUDENTS' CHRISTIAN ASSOCIATION

*President* ........................................ E. N. Ward

## CHAIRMEN OF CLUBS

*Architectural* ........................................ G. L. M. Fowler
*Chemical* ........................................ R. O. Willis
*Civil* ........................................ W. S. R. Edmonds
*Debating* ........................................ G. E. Beament
*Electrical* ........................................ M. H. Brouwers
*Mechanical* ........................................ J. M. Boyd
*Mining and Metallurgy* ........................................ J. H. E. Doyle

## PRESIDENTS OF YEARS

*Fourth* ........................................ J. N. Franklin
*Third* ........................................ E. A. Black
*Second* ........................................ J. S. Ball

## PERMANENT EXECUTIVE

*President* ........................................ G. H. Mason
*Vice-Presidents* ........................................ G. R. Armstrong
W. E. Carruthers
*Secretary-Treasurer* ........................................ R. C. McMordie
*Councillors* ........................................ E. T. Burns
J. R. Crerar
E. B. Wyckoff

# *Message of the Permanent Executive of 3T0*

After four years of exposure to scores of assorted lecture courses, we who have been so fortunate as to weather successfully the storms of each succeeding Spring are about to turn our prows into a still more troubled sea (so we are told) as Alumni. It would ill become us to set down here a list of our successes in the various phases of campus life. We feel that we have done our share to held the Old School to the fore, and we feel confident that those who remain behind us will take the torch and carry on.

Now, a few words to the men of 3T0.

The members of the Permanent Executive wish to thank you for the honour you have bestowed upon us in electing us to our respective offices. We hope that you shall have no occasion to regret your choice.

In order that success may attend our efforts to keep 3T0 an active unit in the Alumni Federation, we must have the full co-operation of every man in the year. The best way for us to retain our identity is for every member to be a subscriber to the University of Toronto Monthly. Through the medium of its pages we may keep in touch with one another, and with the School. May we urge everyone to see that their subscriptions do not lapse.

Besides this, the mailing list of the subscribers to the Monthly is always available to your Secretary, whose address is given below for your use. If you are moving to a new job in a strange town, he can tell you what graduates you may expect to find there. It's a hell of a lot better to breeze into a new town, phone up somebody, and say "Im so-and-so of 3T0. Remember the Snow-fight"? than to mope around a hotel for six weeks looking for somebody to talk to.

So be sure and let us know when you change your address, so that we may know where *you* are, and that *you* may know where everyone else is. Furthermore, if you hear or know of anyone who has been married, or is sick, or has suffered any other misfortune, drop a line to one of the executive, and if we can not be of any help we can at least be sympathetic.

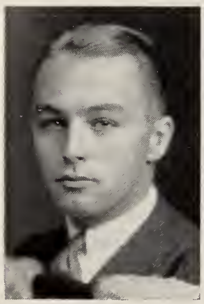
The first reunion of the whole year will be held on November 6-7-8, 1930. You will hear more about this later, but remember the

dates. If you have any suggestions to make about reunions, or anything else, do not fail to let us have them. If you lose our addresses, any letter addressed to the Alumni Federation will be forwarded to your Secretary.

Sons of Martha, we bid you adieu for the present, with best wishes for success and happiness wherever you may go.

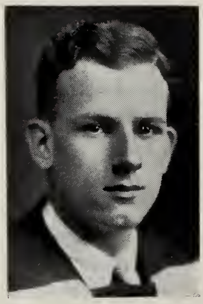
GEO. M. MASON,
*President.*
472 Dovercourt Road,
Toronto.
After June 1; Cascade Inn,
Shawinigan Falls, P.Q.

ROBERT C. McMORDIE
*Secretary.*
94 Wright Avenue,
Toronto.



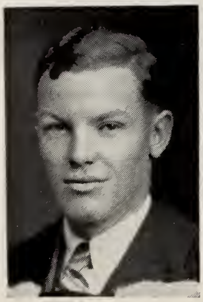
G. R. ARMSTRONG
*Vice-Pres.*

W. F. CARRUTHERS
*Vice-Pres.*



R. C. McMORDIE
*Sec.-Treas.*

E. T. BURNS



J. R. CRERAR

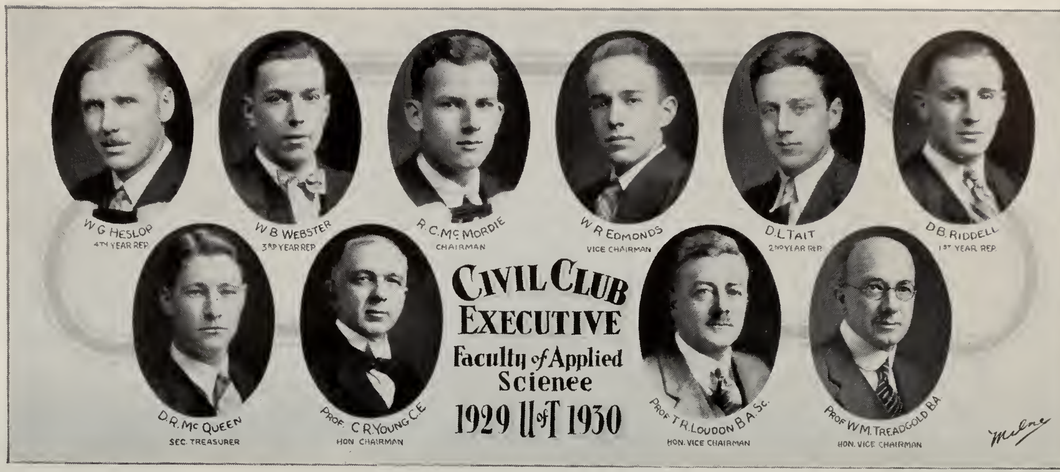
E. G. WYCKOFF

# *The Civil Club*

As soon as we were settled back at School for the Fall term, the election of the Civil Club executive was completed. The death of the well beloved Prof. P. Gillespie left vacant the honorary chairmanship of the club executive, an office which Prof. Gillespie held for many years. Prof. C. R. Young consented to a promotion to fill this gap, and Prof. W. M. Treadgold, on whom the club had called for aid many times before, accepted the other office thus left empty.

For the annual trip, a visit to the nearly completed Welland Canal seemed the logical course. So through the courtesy and with the aid of Mr. Downie and Mr. Cameron of the Canal Engineering staff, arrangements were made for this. Happily the day set aside by the Council for club excursions coincided with the date for an E.I.C. tour of the Canal, and we were thus ensured a most complete inspection of the works. But, unfortunately as it turned out, the weatherman had determined rain for that day. And rain it was. However, in spite of the weather, those who turned out for the trip were well repaid. We travelled from end to end of the Canal, rode on lift bridges, had a water ride along the course of the Canal as far as it was then navigable and a short dash on a jumpy little locomotive over trestle work and around curves that made all the tires scream, and generally viewed everything. Nearly everyone was lost at some time or other over the route. Yet we managed to gather together at the lower end of the Canal and returned to St. Catharines in a body—rather wet and rather muddy and quite hungry. Leaving St. Catharines it seemed that our numbers had shrunk somewhat, but not till a few miles were covered was it definitely proven. With some good co-operation the missing ones were gathered up and all joined again at Hamilton. After visiting a show we boarded the bus and made the remainder of the trip home half asleep from the day's exertions.

About the middle of November a fairly well attended smoker was held in Hart House. After a short sing-song the old test of endurance and stability—a cigar smoking contest—was run off. Much could be said for the stamina of those taking part in this event. In the elimination trials the Third year put the First year to rout and the Fourth beat the Second by about an inch. It was


W G HESLOP
4TH YEAR REP
W B WEBSTER
3RD YEAR REP
R. C. McMORDIE
CHAIRMAN
W R EDMONDS
VICE CHAIRMAN
D. L. TAIT
2ND YEAR REP
D B. RIDDELL
1ST YEAR REP
D.R. Mc QUEEN
SEC. TREASURER
PROF. C R. YOUNG C.E.
HON CHAIRMAN
CIVIL CLUB
EXECUTIVE
Faculty of Applied
Science
1929 U of T 1930
PROF T R. LOUDON B.A.Sc.
HON. VICE CHAIRMAN
PROF W M. TREADGOLD B.A.
HON. VICE CHAIRMAN
Milne

4th YEAR CIVILS

*Back Row, left to right*—G. M. Shaw, J. Emerson, R. C. McMordie, R. Carter, J. Watson, C. Helwig, E. A. Muench, R. Hopkins.

*Front Row*—W. G. Heslop, J. Sutherland, E. K. Beam, L. J. Halliday, A. J. Howden, I. C. Edmonds, J. Stringer, A. Perry.

necessary to re-run the final heat as one of the Third year team devoured part of his cigar prior to the heat. Thus the winners, who proved to be the Fourth year, had emerged on top by virtue of consuming three cigars in about as many minutes running time. That is some record. One half the team had to retire immediately after the victory and was discovered in the reading room surrounded by an admiring group. Through the good offices of Prof. Young, Mr. N. D. Wilson, a prominent downtown engineer, was present and gave a very interesting talk on Rio de Janeiro and some neighbouring cities of that part of South America, where he has spent considerable time. Refreshments in the Great Hall completed the programme.

One afternoon was taken off before the end of the term for a visit to the Union Station and the Railway facilities in the vicinity. The Toronto Terminals Railway very cordially welcomed us to a tour of the Station and in the persons of Messrs. Duncan and Ketterson, showed us all that there was to see about the Station and the yards.

The annual dinner took place in Hart House in the middle of February. After a short toast list to which Prof. Young and Prof. Treadgold responded with much wit and wisdom, we were treated to an address by Prof. Loudon in which some history was given to us from a different angle and in an interesting way that we have never seen quite approached before. The attendance was just average except for the Fourth year who turned out much better than is usual.

The club has called on the professors of the department at various times during the year and always has had unreserved co-operation. We wish to thank very sincerely the members of the staff for the time and effort that they have expended on our behalf.

Concluding, we hope for the club the best success next year and wish the succeeding chairman, Bill Edmonds, the best of luck.

R. C. McMordie

# The Mining and Metallurgical Club

*Engineer's Report on the Mining and Metallurgical Club Prospect*

GEOGRAPHIC POSITION.

In the interests of every undergraduate in the Departments of Mining and Metallurgical Engineering, of the Faculty of Applied Science and Engineering, of the University of Toronto, Toronto, Ontario, Canada.

LIMITING CONDITIONS.

None.

GEOLOGICAL CONDITIONS.

*Type of Deposit*—a batholith of homogeneous purpose, welling up from the Plutonic depths of heterogeneous individuality.

*Mineralization*—the precious metals of Initiative and of Co-operation.

*Wall-rocks*—consist of Character and Determination. The entire region is cut by several series of the parallel dykes of Honesty and of Hard Work.

WORKINGS.

*Development*—despite the entire production to date, the surface has been merely scratched. Sufficient has been done, however, to reveal unbelievable possibilities.

*Plant*—at present the output is controlled by the inadequate Mill of Faculty Examinations. The Mill Staff are highly skilled and competent in their work, but are handicapped by the under-capacity of the Mill.

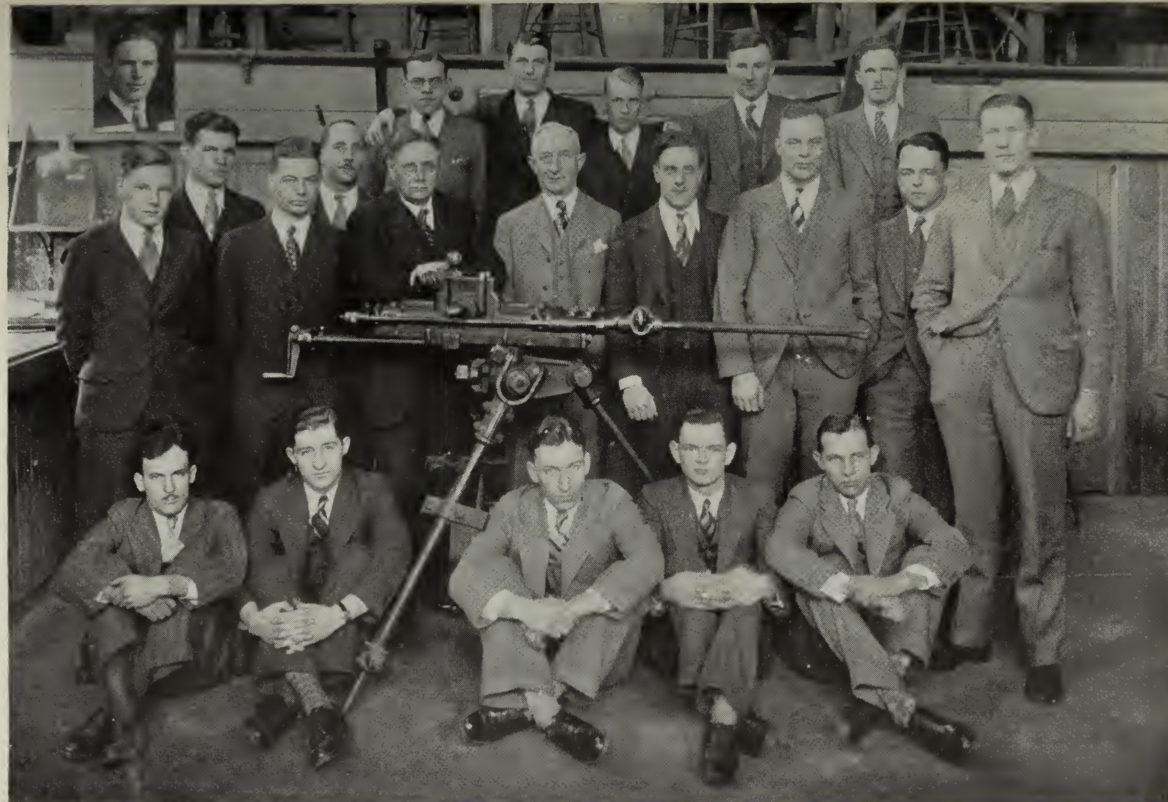
Prior to 1915, prospecting was done on the region by the "Muckers' Club". In the Fall of 1915 the M. & M. Club staked the present holdings. During the War Years and the After-War Years little intensive work was done on the claims.

In 1927 outside parties became interested in the holdings and since that time the property has progressed rapidly.

### Body of Annual Report

During the past year the Honorary Chairmanship was most efficiently filled by Mr. C. G. (Charlie) Williams, Consulting Mining Engineer, an old School graduate.


G. E. Smith
4th Year Rep.
Bertrand Robinson
Chairman
C. G. Williams
Hon. Chairman
J. G. Pierdon
3rd Year Rep.
F. C. Butler
2nd Year Rep.
Lloyd Hallam
Vice Chairman
Mining and Metallurgical Club Executive
Faculty of Applied Science and Engineering
1929-1930
J. H. E. Doyle
Sec Treasurer
F. A. Fell
1st Year Rep.



FOURTH YEAR MINERS AND METALLURGISTS

*Back Row*—K. W. Langford, N. D. Adams, J. M. Cartan, B. W. G. Robinson, V. A. Gladman, G. Mustard, J. A. Knox.

*Middle Row*—A. Hudson, T. Wearing, Prof. H. E. T. Haultain, Prof. G. A. Guess, G. Smith, E. W. Jones, J. A. Patterson, J. E. R. Wood.

*Front Row*—J. Higgins, R. Stone, C. Sherman, L. Bath, L.Hallam. *Insert*—G. Riddell.

The Year's activities were opened by a Smoker and Introduction of Freshmen, during which, the freshmen learnt what really fine fellows they were.

A trip to the Port Colbourne Refinery of the International Nickel Company by the Fourth Year Miners followed. This proved to be highly interesting and instructive. At the same time the members of the other years journeyed to Niagara Falls, visiting various Industrial Plants of interest. As usual, Buffalo was the meeting place for the evening. Quite a bit was seen—of Buffalo.

The terpsichorean desires of the members were satiated most pleasantly at a Tea Dance given at Argyll House by the Association of the Women of the Mining Industry. We wish to extend our heartiest thanks to this organization for the opportunity thus afforded us.

The first dinner-meeting of the Club took place in the Great Hall of Hart House. The speaker of the evening was Mr. C. G. Williams. The head table was graced by the presence of the Professors Haultain, Bain, Rogers and King, and Messrs. Neilly, Bryce and Emery. Mr. Williams laid special stress on "Work and Honesty of Purpose". The open discussion that followed his address showed that the interest of his audience had been greatly aroused.

The December dinner-meeting, held at Hunt's Tea Rooms, was addressed by Mr. W. R. Rogers, Chairman of the Ontario Branch of the Canadian Institute of Mining and Metallurgy. His subject matter dealt with "Maps and their Making". Dr. E. S. Moore told of some of his field experiences in a most interesting manner.

Two meetings were held during February. The first one was held in the Graduates' Dining Room, Hart House. The speaker of the evening, Mr. C. E. (Chuck) MacDonald, an old School graduate, dealt with "Nickel". His slides were most interesting and educational; his address and his answers to the questions asked showed a complete mastery of his subject. A rather unique situation existed at the head table at this meeting—viz.—

The first student president of the Engineering Society, Prof. H. E. T. Haultain, now Professor of Mining Engineering; the President of 1918, Mr. C. E. MacDonald, now Assistant to the Vice-President of the International Nickel Company; and the present President, Mr. Nathan Adams, (still "Nate" Adams) were all present — three mining student presidents of the Engineering Society.

The second meeting was held in the Great Hall, Hart House. Mr. A. A. Cole, Mining Engineer of the T.N.O. Railway, gave one of the finest addresses that has ever been presented to the Club.

The Thirty-First Annual Meeting of the Canadian Institute of Mining and Metallurgy was held during March 5th, 6th and 7th, at the Royal York Hotel. The service committee for this meeting was in the hands of the Club.

### Ore Estimate

Trenches of Perserverance have uncovered pay ore to the width of the members' interest over a length of the Club's existence. The possibilities of the ore extending to depth depends entirely upon the members' Activity and Sincerity.

### Treatment of Ore

With these minerals of Initiative and Co-operation, the same law applies as to all other things worth while, viz.— The amount of recoverable values depends entirely upon the amount of values expended thereon.

The product is a clean, easily worked and adaptable product, malleable only when hot, but not subject to permanent deformation.

The market open to the product is world wide — remember, S.P.S. Miners and Metallurgists on every Continent.

### Valuation of Prospect

It is the opinion of this present Executive that, if the future interest shown in the Club by its members is but a continuance of that shown during the past year, the certain success of the Club is assured.

### Conclusion

The retiring Executive wish to take this opportunity to thank each and every one of the members of the Club for the hearty co-operation shown the Executive, and also to thank the Secretary-Treasurer, Eddie Doyle, for his energetic and efficient filling of his office. Assured that great things await the Club, we step aside for the incoming Executive.

Bertrand Robinson,
*Club Chairman.*

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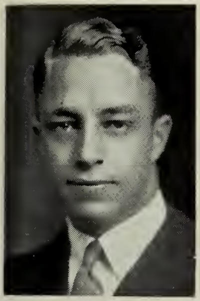
# Gull Lake Survey Camp

Last August, saw the annual gathering at Gull Lake, of some thirty-five of those most fortunate of engineering students, the Third Year Miners and Civils. The Survey Camp, a beautiful spot one hundred and fifty miles north-east of Toronto in a wonderful lake-studded district, consists of some two hundred acres of rolling, heavily-wooded district. Being an ideal location for the practice of surveying and geological work, it provides more than ample facilities for all manner of summer recreation as well.

One cannot, in a few words, even begin to describe the varied joys of the camp. But here was spent what many termed, "the most pleasant five weeks of their lives." Mere mention of incidents recalls a host of memories—regatta, the barbers' school, areal mapping, bunk-house dances, beach fires, the cookery, railroad curves, cottages, canoe trips, Camp-to-Minder canoe race, friendships old and new, sing-songs round the massive bunk-house fire place, committees, the "society," best of all the professors,—what a happy blend of work and play.


1929
1930
Prof. R. W. Angus B.A.Sc.
Hon. Chairman
H. J. Muir
Chairman
Prof. E. A. Allcut M.
Hon. Vice Chairman
Mechanical
Club
Executive
Faculty of Applied
Science
F. K. Ross
2nd Year Rep.
R. B. Rochester
Vice Chair and 4th Year Rep.
B. B. Puddy
Sec. Treas. and 3rd Year Rep.
A. S. Barber
1st Year Rep.
Milne



# *The Mechanical Club*

Looking back over 1929-30 we see the Mechanical Club blossoming forth at last as an individual unit of the Engineering Society and registering its first successful year.

To set down in detail all the activities and happenings were indeed a task. By digging down into the archives and vaults of the Mechanical Building you can discover reports, hundreds of 'em, that will tell where the power comes from at Queenston, how the aeroplanes soar over Buffalo and why the wheels go round in Galt. But there are things that happened that you won't find narrated in those reports. There are still some questions that have not been answered.

For example, why did Professor Stienmitz miss the boat one morning last October when the Fourth Year Mechanicals and Electricals made their annual invasion into the Niagara Peninsula? And what other of Niagara's industries did Messrs. Murby, Grosvenor, Reed and Watts inspect besides power development?

That was the day Professors Zimmer and Taylor undertook to explain what was going on in the Queenston Power Plant, the Ontario Power Intake and the Niagara Falls Power Company's Plant. The morning was occupied with a boat trip, a street car ride, and inspection of the first of the above mentioned installations. Then a visit to that important establishment, the Refrectory, where no guides nor instructions were necessary for complete and efficient operation. In the afternoon, there was a trip across the river to inspect American developments and methods. The trip home, however. was the climax of the day. Pat Bayley and Stan. Murphy supplied the music; the passengers supplied six girls, and fifty-odd embryo engineers did the rest.

A few weeks later, October the 23rd, to be exact, the whole club journeyed forth to visit a variety of industrial concerns. First Year, seventy-four of them, under Professor Taylor, delved into the mysterious arts of making bolts and rubber tires. They divided into two groups and each spent half the day in the New Toronto plants of the Canada Steel Company and the Goodyear Tire and Rubber Company. The latter company's cafeteria supplied the lunch and the boys reciprocated by posing for a photograph.

4th YEAR MECHANICALS

*Back Row*—W. A. Rooke, H. J. Muir, G. R. Armstrong, R. B. Rochester, S. Sanofsky, D. H. Cooey, M. Knysh.

*Middle Row*—A. E. Aeberli, A. T. Jones, F. Grosvenor, D. Reed, H. R. D. Graham, W. R. Watts, E. R. Jarmain, S. F. Murby.

*Front Row*—J. R. Crerar, B. M. McKay, Prof. R. W. Angus, Prof. W. G. McIntosh, Prof. E. A. Allcut, Prof. R. Taylor, Mr. G. H. Harlow, Mr. R. T. Waines, P. O'M. Sims, J. R. Millard,

*Inset*—G. Rochereau de la Sablière.

In the meantime the balance of the club had finally succeeded in reaching Buffalo, where the Second Year, under Professor McIntosh, investigated the process of producing structural steel in the mills of the Bethlehem Steel Corporation. Third and Fourth Years, with Professor Allcut, spent a busy day at the Curtiss Aeroplane Company and the H. R. Huntley Station of the Buffalo General Electric Company. The efficiency and effectiveness of the modern machine shop in comparison to the old, as well as the development of mass production in the aircraft industry were vividly portrayed. The other feature, the Huntley Station with its unique pulverized coal installation, left little to be desired in the day's activities.

There were unofficial happenings that day as well. Not all the study of curves and stream-line shapes was made under Curtiss guidance.

Early in December the club held a smoker in Hart House when Eddie Jarmain discussed something about aeroplane and automobile engines, and a general discussion followed. The evening closed with a few remarks from Professor Allcut and reminiscences on the part of Professor Angus on the early days of internal combustion engine design.

Just before Christmas the Third Year spent an afternoon in the shops of the John Inglis Company, gaining some first hand information on machine shop practice.

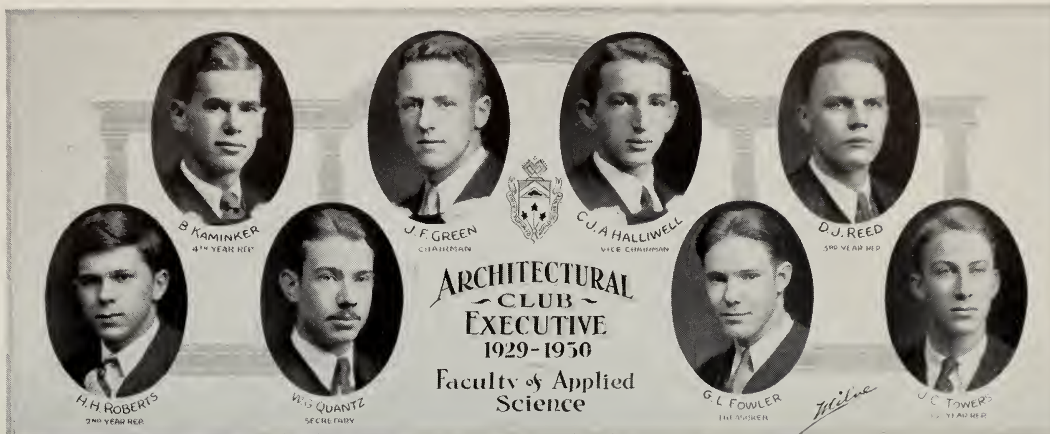
It was along in January that we again made an early morning start and visited the growing metropolis of Galt. It was a cold morning to crawl out of bed but the boys turned up more or less on time to visit a few of the main industrial plants. The Canadian Machinery Corporation held our attention until about one o'clock, but then nature asserted herself and there was a general retreat for a tea room where the matter of nourishment was carefully attended to. Seldons, Limited, was the rendezvous after lunch and trips through their factory and those of Goldie-McCullough and Babcock-Wilcox completed the programme for the day.

The event was well rounded off by a dinner and meeting of the A.S.M.E. where a group of young mechanical engineers ably proved to their older brethren their capacity and technique where roast chicken was concerned.

February saw an excursion into the automobile industry when members of the Third Year visited the Willys-Overland Company. The day was devoted to observation of machine shops, assembling and testing.

So much for the past. Another year looms in the future when a new group will take charge of the club's affairs. To them we wish every success and trust they will receive the enthusiastic support of all members of the club.

H. J. Muir,
*Chairman.*


B KAMINKER
4TH YEAR REP
J.F. GREEN
CHAIRMAN
C.J.A HALLIWELL
VICE CHAIRMAN
D.J. REED
3RD YEAR REP
H.H. ROBERTS
2ND YEAR REP
W.G QUANTZ
SECRETARY
ARCHITECTURAL
CLUB
EXECUTIVE
1929-1930
Faculty of Applied
Science
G.L FOWLER
J.C TOWERS

# *The Architectural Club*

The Architectural Club has enjoyed an average year, no better than former, but we think certainly no worse.

A picnic was held in the guise of a sketching trip to Gull Lake for a week at the beginning of the fall term. Mr. Jeffereys, our instructor in Art, collaborated with Professor C. H. O. Wright in making the trip worth while, both from a standpoint of pleasure and of instruction. The dance which was held in Stewart Hall while at Gull Lake came as a strange interlude, and the decorations carried out with the aid of fall colours in leaves and the Misses Jefferys and Centner, put it across with a bang.

Scholastic dullness was resumed on our return to academic work, and remained unbroken until our Annual Club Banquet, held at an uptown tea room. Mr. Chapman, a Beaux Arts man, and our Honorary Chairman, spoke very entertainingly on student life in the art ateliers while studying in France. For the benefit of those who are not in the habit of reading accounts of Architectural Club activities, we would add that "after the address the usual stunts and skits were administered to the Freshmen, to the amusement and entertainment of all present, with the possible exception of the Frosh."

The other Club activities are not worth writing about either to Transactions or home, and as they would not come near to using up the remaining thirty words we shall leave them unsung.

J. F. Green,
*Chairman.*

4th YEAR ARCHITECTS

*Back Row, L. to R.*—J. F. Green, Prof. E. R. Arthur, Prof. H. H. Madill, Prof. Mackenzie Waters.
*Front Row*—B. Kaminker, Miss B. Centner, C. R. Wideman, C. J. A. Halliwell, C. G. Edwards.

# *The Industrial Chemical Club*

After the lapse of a whole year we have once more been assigned this page wherein to sum up the activities of the Club.

The activities for the year started with a Smoker at Hart House. At this meeting officers were elected, followed by a very interesting and much appreciated talk on "Chemistry in the Detection of Crimes" by Professor L. J. Rogers. We certainly received a very vivid description of crimes and their detection, which to us seemed to be a whole science in itself. The evening was concluded as usual with eats and yells in the Great Hall.

Early in the term the Club held its annual trip, which took us first to the Lincoln Mills at Merritton, Ontario. Here we were met by some former members of the Club and other officials of the mill, who, after a short explanatory talk, showed us through the Sulphite Pulp and Lybster plants, explaining the processes employed. After a dinner in St. Catharines, we went on to Niagara Falls, New York, where the Hooker Electrochemical plant was inspected.

Later on in the term, the Fourth Year members of the Club visited the Wood Distillation plant of the Standard Chemical Company at Longford, and were royally entertained there by the representative of the company.

Mr. Ross Elliot of the Low Brothers Company addressed the Club at our next meeting, giving an illustrated talk on paints and allied materials.

The Club was much in evidence as ever at School-nite, because after all, who can mix the drinks as well as a Chemical.

Before the year ends we hope to have two more meetings and of course the annual dinner, which is always very popular, both from the social and educational standpoint.

It is yet too early to give any intimation as to next year's executive, but it is with a hope of real success for the coming year we pass over the reins to the incoming Chairman, and trust that he will be excellently supported by members of the Club.

A. R. WALLBERG,
*Chairman.*


R.K. ILER
4TH YEAR REP
A.B. MACPHERSON
3RD YEAR REP
A.R. WALLBERG
PRESIDENT
R.O. WILLIS
VICE PRES.
E.A. PEAKER
2ND YEAR REP
N.J. PATERSON
1ST YEAR REP
INDUSTRIAL
CHEMICAL
CLUB
EXECUTIVE
Faculty of Applied
Science
1929
U of T
1930
W.H. BOWMAN
SEC. TREAS.
PROF J.W. BAIN
HON. PRES.
PROF E.G.R. ARDAGH
HON. VICE PRES.
K.F. MUELLER
CURATOR
Milne

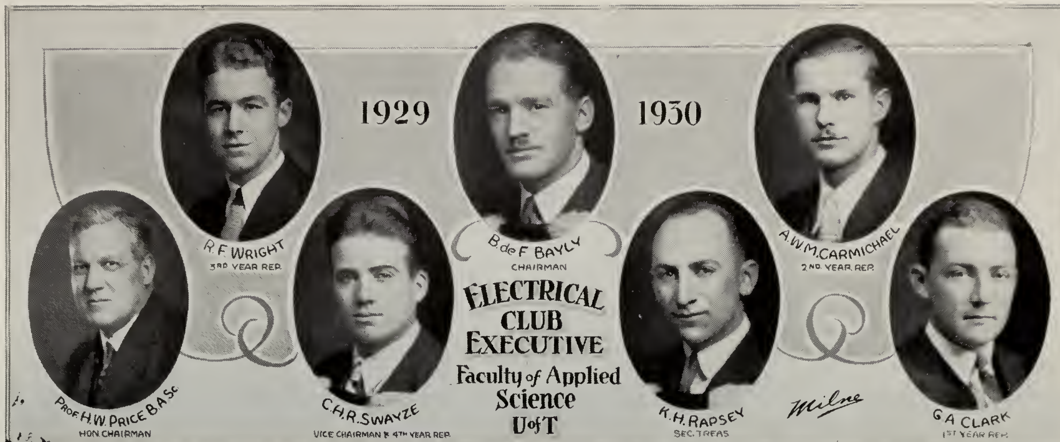
4th YEAR CHEMICALS

*Front Row*—Dr. Boswell, Professor Bain, Professor Ardagh, Professor Smith, Professor Rogers.

*Second Row*—C. M. Humber, Y. Lee, R. K. Iler, H. B. Barton, W. M. Inouye, A. C. Holm, J. A. Downing, F. C. Rutherford.

*Third Row*—R. M. B. Roome, I. C. Hardy. A. R. Wallberg. W. L. Rambo. D. G. Haines. E. G. Heslop, J. C. Morgan.

*Fourth Row*—C. J. McDonald, W. A. McKay. L. Y. Clegg. S. T. Jones. F. A. G. Lake. J. H. Borland, N. F. Helper, H. L. Sandford, J. P. Grant, G. M. Mason.


1929
1930
Prof. H.W. Price B.A.Sc.
Hon. Chairman
R.F. Wright
3rd Year Rep.
C.H.R. Swayze
Vice Chairman & 4th Year Rep.
B. de F. Bayly
Chairman
Electrical
Club
Executive
Faculty of Applied
Science
U of T
K.H. Rapsey
Sec. Treas.
A.W.M. Carmichael
2nd Year Rep.
G.A. Clark
1st Year Rep.
Milne

# *The Electrical Club*

According to our lectures on Industrial Management, this is the era of mergers, but the Mechanical and Electrical Club of last year decided to pursue the opposite course, with the result that the present Electrical Club was formed.

The Queenston trip last fall added greatly to the wisdom of all concerned. The students learned all about Jean, and considerable about blackjacks. The professors learned that the behaviour of this year's crop was much the same as that of other years on similar occasions. The power companies learned that schoolmen are rabid collectors. It is even rumoured that some persevering souls learned a few things about power development. This last attitude, however, was not noticeable to any large extent.

The visit to the Hilly Hamlet, alias Hamilton, was accompanied by tours through several industrial plants, with the inevitable corollary of a theatre night. Whether or not this was originally included in the official program, it was, nevertheless, one of the bright spots of the day. We pause to shed a tear for the fate of Toronto, where theatre owners are so grossly misinformed as to look askance upon Schoolmen in large parties.

This spring brings the fateful examinations, and other activities must of necessity fade into the background.

B. DE F. BAYLY,
*Chairman.*

4th YEAR ELECTRICALS

*Back Row*—K. Evans, E. T. Burns, S. N. Lawrence, W. R. Harmer, H. D. Chapman, K. H. Rapsey, D. E. Bridge, H. D. Armstrong, C. H. Shedden, A. P. Blair, S. T. Fisher, C. B. Fisher, C. O. Baldwin.

*Middle Row*—Mr. R. J. Brown, Mr. V. C. Smith, Prof. H. W. Price, D. C. Smith, P. L. McKay, F. H. Canniff, V. M. Martinoff, L. C. Meyer, W. E. Carruthers, W. Dowds, J. W. Looney, I. O. Mather, A. B. Nobbs, Prof. T. R. Rosebrugh, J. G. Catterall, W. Wilcock, B. deF. Bayly, Prof. A. R. Zimmer.

*Front Row*—H. A. Courtice, C. H. R. Swayze, J. R. Turnbull, E. C. Wyckoff, L. F. Cockburn.

# *The Debating Club*

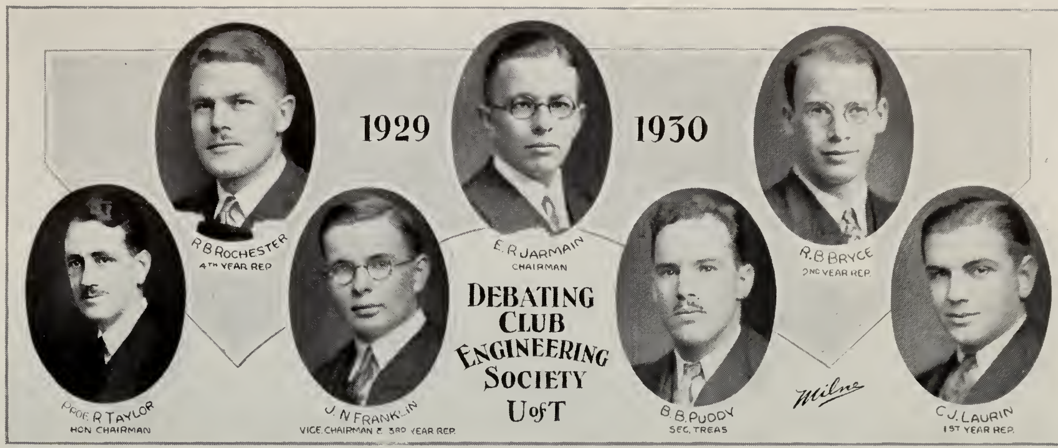
Most young men have an ambition, more or less strong, to become advocates—to be able to convince judges and persuade juries by the power of their logic and graces of their style and utterance. It is the purpose of this club to help you realize this ambition.

An age-old notion persists that orators "are born, not made", and that industry and perseverance can affect nothing; that everyone must be content to remain just what he is, and that eminence is the result of accident. To acquire any other art, men expect to serve long apprenticeships; to study it carefully and laboriously; to master it thoroughly. If a man would learn to play a musical instrument, he patiently and persistently studies and practises, that he may draw out, at will, all its various combinations of harmonious sounds, and its full richness and delicacy of expression. "And yet," says a learned writer, "A man will fancy that the grandest, the most complex, the most expressive of all instruments, which is fashioned by the union of intellect with power of speech, may be played upon without study or practise. He comes to it a mere tyro, and thinks to manage all its stops, and command the whole compass of its varied and comprehensive power; he finds himself a mere bungler in the attempt, wonders at his failure, and settles it in his mind forever that the attempt is vain"—that it can be done only by a genius.

To hold the opinion that excellence in speaking is a gift of nature and not the result of patient and persistent labour and study is a grave, unfortunate error. Each one of us has been given the power of speech; each one of us possesses intellect—all we lack is development. We engineers pride ourselves that we are practical, that our education has been polyphase, and yet most Schoolmen are sadly neglecting one phase of their development which is equal in importance to athletics or any other, namely, the alertness of mind and the facility of formulating one's thoughts while addressing an audience.

I feel sure that if every man will take inventory of himself this summer, that the Debating Club supporters will be much more numerous next year.

Although the club was late in getting started this year, and its supporters have been few, its activities have been quite enjoyable


1929
1930
DEBATING CLUB ENGINEERING SOCIETY U of T
PROF. R TAYLOR
HON CHAIRMAN
R B ROCHESTER
4TH YEAR REP
J. N FRANKLIN
VICE CHAIRMAN & 3RD YEAR REP
E. R JARMAIN
CHAIRMAN
B. B. PUDDY
SEC. TREAS
R. B BRYCE
2ND YEAR REP.
C.J. LAURIN
1ST YEAR REP.
Milne

and beneficial. In the usual series of Inter-Year debates, Messrs. Lutton and Barbour for the first year, and Messrs. J. V. Reid and Westaway for the second year debated that "Literary and Dramatic Censorship should be Abolished in Canada." After lengthy deliberation, the judges declared the first year, upholding the affirmative, as victors.

Messrs. Rochester and Muir for the fourth year, and Messrs. Beament and Franklin for the third year, debated "Resolved that Communism should be Suppressed in Canada." The third year, upholding the affirmative, were victorious. The subject of the final debate was, "Resolved that War is Inevitable." The decision was awarded Messrs. Beament and Franklin of the third year, upholding the affirmative. Thus the names Beament and Franklin will be inscribed on the Segsworth Shield this year. Lutton and Barbour of the first year, argued for the negative.

The annual oratorical contest is yet to be held, and the usual burst of oratory and enthusiasm is expected in the battle for the silver trophy and the cash prizes.

The club wishes to extend sincere thanks to Prof. Taylor as Honorary Chairman, and to Prof. Zimmer, Prof. Allcut and R. T. Waines for the courtesy and support they have so willingly given.

Next year promises to be the best yet, under the able leadership of Ted Beament, and we wish him the best of support.

E. R. Jarmain,
*Chairman.*


1929
1930
N D ADAMS
COMMITTEE
G.M. MASON
CHAIRMAN
U of T
E R. SHARPE
SEC TREAS
G R ARMSTRONG
COMMITTEE
SCHOOL
DINNER
COMMITTEE
Faculty of Applied
Science
C ROCHEREAU de la SABLIERE
COMMITTEE
G H McVEAN
COMMITTEE
G.A LEE
COMMITTEE
C L NEIL
COMMITTEE

# *The Annual "School" Dinner*

The Fortieth Annual School Dinner, held in the Great Hall, at Hart House, on December 3, 1929, proved to be, we believe, the most successful Faculty Dinner that has been held on the Campus for many years. This may sound rather like an exaggeration, but the fact that the dinner was attended by almost 500 undergraduates and 50 members of the staff is indicative of its popularity.

Under the able guidance of Nate Adams, who acted as Master of Ceremonies, a program of toasts and speeches was very smoothly run off, to the evident satisfaction of all present. Toasts to the University, the Faculty, the Profession, and Sister Organizations in other Universities were proposed by undergrads, and never did Cicero address the Senate with more eloquence and dignity than that displayed by Gerry McVean, Bert Tyson, Gerry Wood and Pat Bayly.

Sir Robert Falconer replied to the toast to the University in his own inimitable manner, while Dean Mitchell and Professor Bain gave us much food for thought in responding to the Faculty and Profession respectively.

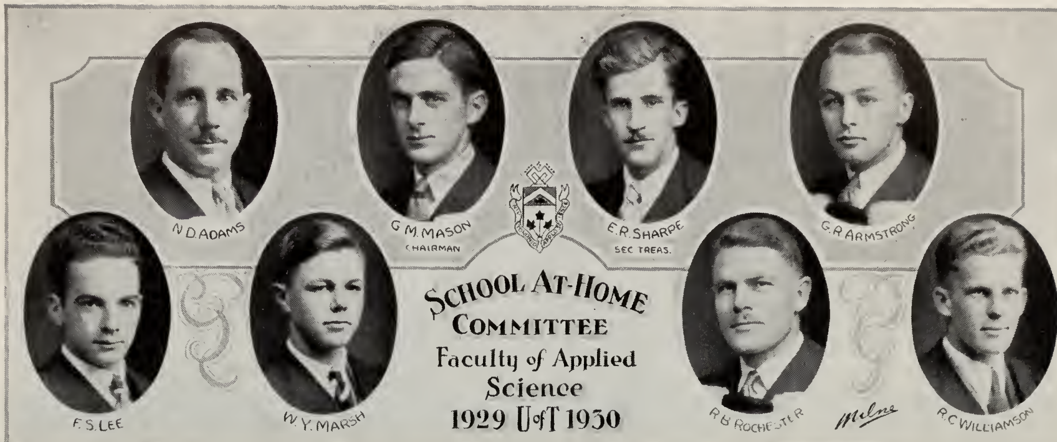
The representatives from Queen's, McGill, and O.A.C. brought the best wishes of their own colleges, and seemed as glad to be with us as we were to have them.

At the conclusion of the toasts, School athletes had their innings when Prof. Loudon presented the cups to the victorious School crew and medals to the winners of the School Assault.

The crowning achievement of the Dinner was reserved till the last, when we were privileged to listen to addresses from Dr. J. H. Cody and Lieut.-Col. J. B. McLean. Any attempt to enlarge on their remarks in the limited space at our disposal would be quite futile. May we again thank these gentlemen for coming to speak to us.

The Committee wish to thank those men who gave their time to help toward the success of the Dinner, and the members of the whole School for their very loyal support.

G. M. Mason,
*Chairman.*


SCHOOL AT-HOME
COMMITTEE
Faculty of Applied
Science
1929 U of T 1930
N. D. ADAMS
G. M. MASON
CHAIRMAN
E. R. SHARPE
SEC. TREAS.
G. R. ARMSTRONG
F. S. LEE
W. Y. MARSH
R. B. ROCHESTER
R. C. WILLIAMSON
Milne

# *The "School" At-Home*

The Engineering Society At-Home, held at the Royal York on February 26, 1930, lived up to tradition as one of the season's most successful parties. In numbers it was the largest At-Home in undergraduate memory, as 350 couples danced to Romanelli's Orchestra in the Concert Hall on that memorable Wednesday evening.

The guests were received by Mrs. C. H. Mitchell, Mrs. C. R. Young, Mrs. H. E. T. Haultain, Mrs. C. H. C. Wright, Mrs. R. W. Angus, Mrs. L. J. Rogers, Mrs. G. A. Guess, Mrs. H. W. Price, and Mr. N. D. Adams, the President of the Society.

At midnight a supper in the Convention Hall supplied the necessary carbohydrates and proteins to sustain the spirit of gaiety until the orchestra played "The King" at 3.00 a.m., thus bringing to a close another School At-Home.

G. M. Mason.

# *The Junior "School" At-Home*

When Wednesday, January 15th, rolled around, thoughts of recent examinations were thrust into the background, unfinished "Lab." reports found their favourite place on the floor—and once again abandon reigned in every Schoolman's heart—Why, you ask? Because the Junior School was holding its annual party at the Embassy Club.

Over one hundred and fifty men were lured by the attractions. A huge sign outside the Engineering Society promised. When they arrived at the club they found there was dancing from nine-thirty to two-thirty, the music for the occasion was supplied piping hot by John de Courcey and his fellow syncopators, and a buffet supper was served upstairs from eleven to one o'clock. A variety of novelties and lucky-number prizes lent colour and gayety to the evening.

The enchantment of the Embassy Club was eclipsed only by the bright gowns and sparkling eyes of the fair young ladies present who, true to the traditional Schoolman's taste, were "the smartest in town". During lulls in the music many future engineers could be seen impressing their ladies with scientific theories about shock absorbing floors.

Let us here express our sincere appreciation to the "Year Executives", for their untiring efforts to make this party the great success it was. And in closing, we hope for bigger nights, more such parties and executives.

M. A. Elson, 3T3.

# *Stunt Night*

Hart House on Tuesday, January 28th, 1930, was the meeting place to which all S.P.S. men and their fair associates turned their steps. For this was the occasion of the annual Stunt Night.

Mrs. C. H. Mitchell, Mrs. T. R. Loudon, Mrs. A. R. Zimmer, and Mrs. R. Taylor very kindly consented to act as patronesses.

John Franklin and his crew of sailors held forth in the Big Gym where their sturdy ship was stalled by engine trouble. Before they had finished, the audience were convinced that a sailor's life may not altogether be a happy one, but it has its humorous moments.

Keith Rapsey and his 4th Mechanicals and Electricals attempted to solve the mystery of the haunted house. Whether or not they did this to everybody's satisfaction or not was of little account, as it was received for what it was worth by a nervous, anxious audience.

A skit put on by an organization, better unnamed, entertained an appreciative gathering in a variety of ways. The subject of this skit and its working out remained a complete mystery, and doubt was expressed whether the actors knew what they were doing or not. This opinion, of course, was based solely on the fact that the subject was a very intricate one.

Johnny Goss and his team of swimmers gave a spectacular display of water polo as it should be played. Although the crowd was terrific and the enthusiasm great, no casualties or near drownings occurred.

After the skits were over, Herb Smith provided melody superior for all who wished to dance.

Supper was served in the Great Hall in a very acceptable manner. In fact so delicious was the food that some of the spoons were licked so clean that they disappeared entirely.

And so, with a bellowing Toike Oike, the 1930 Stunt Night passed into history, where all Stunt Nights find a happy resting place safer than ever from any wandering U.C. or Med.

W. A. Rooke.
*Chairman.*

# *Graduation Dance*

It would seem that the spirit of a last "get-together" had pretty well permeated the class of T0, when, on that memorable evening of March 6, the Graduation Dance passed into history in the Roof Garden of the Royal York Hotel.

What could be more appropriate with the "Elections" on the morrow than to cast aside all the impending gloom of the coming exams and revel in the glamour of rainbow lights, laughing eyes and dancing feet. It was certainly a jolly crowd of Schoolmen together with their charming ladies that danced and frollicked to the syncopated melody so capably offered by our friend Herb Smith and his group of talented artists.

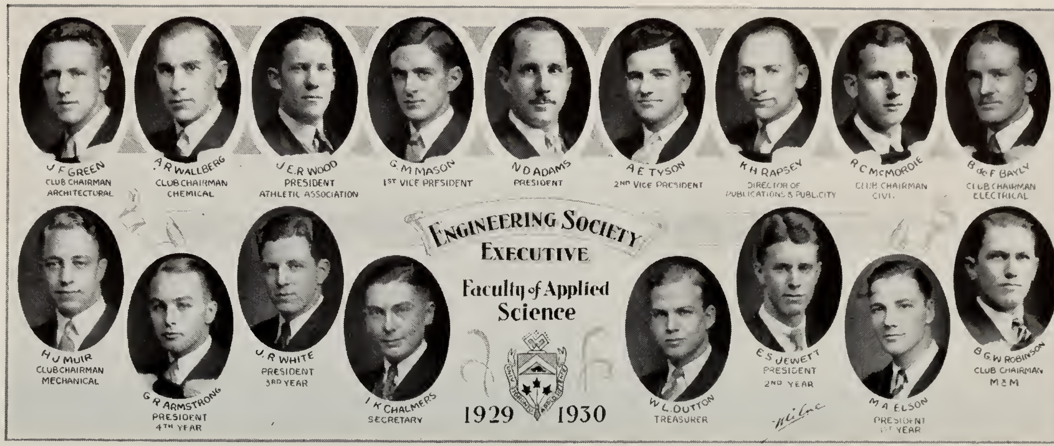
Supper was served in the Ballroom at midnight and added in no small way to the general air of satisfaction which pervaded the function throughout, allowing much frivolity and a delightful repast.

Much interest was aroused by the novelty and lucky number dance. George Smith and his lady friend were the recipients of the lucky number prize and very graciously consented to give the solo dance of the evening.

And so on into the wee hours of the morning until finally the strains of the last waltz died away when the festivities gave way to early breakfast parties and for some a few hours of sleep.

The members of the committee, G. R. Armstrong, E. T. Burns, R. B. Rochester, and J. C. Edmonds, wish to extend their thanks and appreciation to Mrs. T. R. Loudon and Mrs. R. Taylor, who kindly consented to act as patronesses.

JAS. C. EDMONDS.


ENGINEERING SOCIETY
EXECUTIVE
Faculty of Applied
Science
1929 1930
J F GREEN
CLUB CHAIRMAN
ARCHITECTURAL
A R WALLBERG
CLUB CHAIRMAN
CHEMICAL
J E R WOOD
PRESIDENT
ATHLETIC ASSOCIATION
G M MASON
1ST VICE PRESIDENT
N D ADAMS
PRESIDENT
A E TYSON
2ND VICE PRESIDENT
K H RAPSEY
DIRECTOR OF
PUBLICATIONS & PUBLICITY
R C McMORDIE
CLUB CHAIRMAN
CIVIL
B de F BAYLY
CLUB CHAIRMAN
ELECTRICAL
H J MUIR
CLUB CHAIRMAN
MECHANICAL
G R ARMSTRONG
PRESIDENT
4TH YEAR
J R WHITE
PRESIDENT
3RD YEAR
I K CHALMERS
SECRETARY
W L DUTTON
TREASURER
E S JEWETT
PRESIDENT
2ND YEAR
M A ELSON
PRESIDENT
1ST YEAR
B G W ROBINSON
CLUB CHAIRMAN
M & M

# *Graduating Year*

In the fall of 1926 one hundred and eighty some odd freshmen enrolled in the Faculty of Applied Science and Engineering. These men came from all parts of the Dominion, were of every type and character, but exhibited one common feature characteristic, however, of all freshmen—they carried themselves like those who thought they knew a great deal.

The spring of 1930 finds these men with a new common characteristic. Like a mountain climber or a person taking his first flight they have now reached a height, and though the peak is still high above, they can see, and seeing, realize they know nothing.

Four years have been spent here with many trials and tribulations. New associations have been formed, some of which will last as long as this life. At this point, may the writer express the hope that in the ensuing years may the 117 meet again and carry on, for a day or so at least, from point—graduation.

When looking back and realizing what past years have contributed to building up School tradition, one hesitates to mention any particular accomplishment of 3T0. But I think it can be said that in no way has the year let down these now honoured customs, be they scholastic, social or of an athletic nature.

And now the time is drawing to a close — one hundred and seventeen men are anxiously waiting to complete the final lap that they may go forth, as it were, and take their part in the development of this country. In the years to come may some of the great engineering feats carried on in this country or in others be attributed partially at least to some men of Applied Science and Engineering 3T0.

G. R. Armstrong,
*President* 3T0.

# 3T1

The term had not progressed many weeks before the members of 3T1 had found that life was not one continual round of pleasure and that the responsibilities of being in one of the senior years curtailed, to some extent at least, their activities.

In spite of this, however, during the first few more or less riotous weeks, we found time to both incite the Frosh to deeds of rashness and to aid the Sophs whenever it was felt that the good name of the upper classmen was at stake.

The class parties this year were held as usual at Parkdale Canoe Club, one in October and one in February. These parties were quite gala occasions, marked especially by the pulchritude of the ladies whom even the gentlemen of the hairy ears seem to require in the festive moments.

Besides the social activities of the year, 3T1 has been prominent in all branches of athletic endeavour—we regret that we may only mention a few in passing. In football Early Davey and Jack White managed to be among those present on the Intercollegiate team, while Tuffy Burk on the Orphans, and Johnny Baillie and Bill Algie on the Intermediates, merit much praise. Among the Intercollegiate bruisers we have "Dynamite" Bert Tyson, Bill Brownlee and Harry Fields. Duff Thompson is, as usual, trying to ruin any or all records on the track and is fulfilling hopes held for him last year. In Water Polo, Bruce Alexander has been one of the leading scorers in the International League, and Jim Pierdon has been leading the way in the swimming team. Boyd and Davison were prominent among the oarsmen.

In Interfaculty sports 3T1 has supplied more than generously the School teams with stellar performers. It was no fault of Alf Hancock that Senior School did not win the Mulock Cup this year, and the Senior School Water Polo team showed real class even though defeated in the finals by Junior School.

As this year draws to a close we cannot help but having a feeling of satisfaction at standing on the threshold of the last lap of our University career. Our academic life will soon be over, but the friendships made here will last, and perhaps in the pleasure and comfort they bring will be a greater and more lasting benefit than any other single thing we have accumulated here at School.

Before closing I would like to express our appreciation of the executive this year—John Franklin, Karl Moeser and Jim Boyd—the finest executive a president could desire.

May the examiners be kind!

J. R. White,
*President.*

# 3T2

Green ties, here, there, everywhere; this was the sight that greeted us when we gathered once again in the Old School last September. Vacation work and holidaying behind us, we were once more prepared for the battle. True to the School traditions we at once extended a very warm and hearty welcome to the Freshmen. With great thoroughness we proceeded with their education in certain matters, *i.e.*, hats, ties, etc. In some cases a strong disinclination to our teachings was encountered, but the customary method of persuasion proved effective in every case.

The climax was reached on the evening of October 10, when 275 Freshmen were escorted in a semi-nude condition to our drafting room, and there allowed to perform for our amusement.

Without a doubt the outstanding event of the fall term was the Soph-Frosh Banquet at the King Edward Hotel on November 14. Under a barrage of sugar cubes, olives, rolls, and delightfully brief speeches, hostilities were forgotten, and Soph and Frosh became united in the great fellowship of Schoolmen.

Despite our reputations of being "Big Silent Men from the Great Open Spaces", we do occasionally enjoy the company of the weaker sex. It was therefore decided that we should give the girls the privilege of company, and to throw a party. The evening of November 21, found us gathered at Parkdale Canoe Club. What a party! Joe DeCourcy provided the rhythm, the boys the whoopee, and the girls—well.

January 15 rolled around, and with it the Junior School At-Home at the Embassy Club. Soph and Frosh were united to make this a good party. The location, the music, everything, was perfect, and everyone was unanimous in voting it the best Junior School Dance in years.

We have been very well represented in athletics this year. Ed Peaker, Mal Smith, Freddie Lee, Ed Hymmen, Ralph Adams, and Logie Donaldson have done well with the track team. In football we had "Dinty" Traynor, Carl Britnell, Bunny Crocker, Jerry Dickson, and Don McCallum. In swimming Jack Powell, Harold Hayhoe, "Ev" Withrow, and Bob Bryce did much to bring the Eckhardt Cup to Junior School. Because of the lateness of the season we decided to hold our second class party in partnership with the Freshmen. Columbus Hall was the scene of the merry-making, with Jack Slater providing the harmonies. It was a huge success.

Now that the smoke of the elections has rolled away we find many changes. Ernie Black is the new class president, and so to Ernie and his executive, Frase Ross, and Bill Brown, we hand over the duties, and responsibilities of the office, wishing them the best of luck during the coming year.

E. S. Jewett,
*President.*

# *3T3*

Well, fellows, we have just about completed our first year at School—and what a fine year it has been! Is it possible that seven months have elapsed since we first assembled in the now familiar draughting-room? At that time we were strange and unknown to one another, but I feel now that our strangeness has long since departed. How could we be ignorant of our neighbour's eccentricities when we have enjoyed his company both at, and not at lectures, helped him with the fine art of drawing and even battled side by side with him against our so-called "betters" (meaning our friends the sophs). What more do we need to confirm the priceless bonds of friendship which we shall cherish in after years, when every quarter of the globe calls us to do its bidding?

The first few days of School this year, were pretty hectic to most of us, because it was during this period that the Sophs, with the help of the Juniors and Seniors, tried to put the little freshmen in what was considered to be their place. Although they succeeded in razzing some individually, collectively we were too much for them. The climax to our pre-lecture fights was enacted before drawing lab. one afternoon with the result that it was necessary for the Sophs to bring mechanical power to their aid in the shape of a fire hose. Fortunately, School had more than one of these weapons, so that when the battle was stopped by the higher authorities, the Sophs had decided that water in its place was all right; but, in a School hall, all wrong, especially since the frosh hose found its mark with unerring aim.

One night last October, we peacefully submitted to our formal initiation. Substituting burlap socks and running shoes for dress suits and patent oxfords, the occasion turned out to be one of solemnity and mumbled curses. After the soft soap and barrel slats had served their purpose, we gathered in Hart House where all feeling of enmity was dropped, and we joined with one accord to sing and yell until the night grew late.

During this period our elections were held; and may I thank you here, men, for electing me as your president; my hope is that I have succeeded in living up to what you expected of me. Our aim as an executive has been to make 3T3 a year second to none, and whether or not we achieved it, remains with you—may your verdict be kind. If you give "Stew" Ball, your new president, the support you gave me, I can see a great future for us.

In the School assault, we were ably represented; medals being won in both boxing and wrestling. Later when the Intercollegiate team went to Montreal, Teddy Fell and Grant Eaton were able to win their titles by knockouts. Doug. Smith and Bannister won the titles in their weights in wrestling.

In basketball, we had "Hal" Collins on the Intercollegiate Seniors, and John Enlow on the Juniors. In hockey we had Murray on the Intercollegiate Seniors, and Don Smillie and Williamson on

the Juniors. Other men of our year played on the School Interfaculty hockey, basketball, baseball and water polo teams. Altogether there were credits earned for seven "first T's" by members of our year—a record to be proud of!

During the fall and winter many of our men took part in rugby, both Intercollegiate and Interfaculty. On the Intercollegiate Senior team we had Johnny Fitzpatrick and "Mel" Elson; on the Orfuns, Roger Baker, a former player on last year's Big Blue team, Stringer and Ken Campbell. Doug. Smith was our representative on the Intermediates; and, on the Juniors, we had "Red" King and Eric Ellsworth. Most of the Junior School team was comprised of men from our year, who were too busy to spend the time necessary for other teams.

Since the Sophs had so kindly entertained us, it was made known to the executive from many different sources that the annual Soph-Frosh banquet had been "on deck" for some time. Rumour had it that the said banquet was to be the opportunity for pent-up feelings to find relief; and, since we were not anxious to foot the resulting bill, we waited until our guests had become so weak from hunger that they did not have the strength to carry away a single spoon. Altogether there were two women and four hundred and fifty men present. The speaker of the evening was our own Dean Mitchell, and may I take this opportunity of thanking him for the kindly interest and ready enthusiasm he has shown for 3T3. There were toasts given by members of both years and several professors were asked to say a few words. After the banquet was over, we all went home—if you do not believe that, read "The Varsity" of November 15. Financially the banquet was a huge success—we had to refurnish only one floor of the King Edward.

Up until this time our entertainment had been of a rather commonplace nature, so we planned our first class party for Friday, December 13, at the Parkdale Canoe Club. This was the evening following the finishing of our Christmas exams—and to say that we celebrated would be putting it mildly—it was a wow!

Following the Christmas holidays, we helped to stage the Junior School At-Home, on January 15, at the Embassy Club. It was our only formal party during the year. I think I may confidently say that it was a howling success. As the finis to our social year we held, along with the Sophs, a party at Columbus Hall, on March 9, and called the affair—the Soph-Frosh Final Fling—it was. All of which goes to prove that Schoolmen are not dull boys, since their life is not a case of "all work and no play".

I know, as I draw this article to a close, that some of us may not be back next year. Every day of our life sees new changes, and if such is your case, I wish you the very best of luck and good fortune; and, with a hearty handshake, I hope you will cherish your year with 3T3 as a pal among those friends who live long in your memory.

MEBOURNE ELSON,
*President.*

# *Toike Oike*

This year the Toike Oike reached a state of prime perfection and purity under the able guidance of the editor, Bill Algie. Each edition was sold out very soon after coming from the press and in the Christmas edition two more lots had to be printed to meet the demand. The editor tried to keep the stories and jokes on a pure and righteous footing, but, once or twice his associate editors Hendrick and Pritchard, slipped a little. This caused a faint murmur of indignation from the fourth year, but these were quelled by the insertion of a few Bible stories.

The election issue this year was a change from the former cut and dried "Elect Cement Head Duggan" stuff. Biographies of the candidates were run and the students were able to judge by the candidate's record whom they wanted elected. This also proved a popular issue.

We feel sure that with the editorial material looming up that the Toike Oike will enjoy another successful year in 1930-31.


K. H. RAPSEY
DIRECTOR OF PUBLICATIONS
W. E. ALGIE
EDITOR
M. M. HENDRICK
2ND YEAR REP.
1929 TOIKE OIKE STAFF 1930
Faculty of Applied Science
G. B. PRITCHARD
1ST YEAR REP.


S.P.S.
ATHLETIC
ASSOCIATION
EXECUTIVE
Faculty of Applied
1929 Science 1930
K.W. LANGFORD
4TH YEAR REP.
J.E.R. WOOD
PRESIDENT
E.A. PEAKER
VICE PRES.
R.H. SCACE
3RD YEAR REP.
F.S. LEE
2ND YEAR REP.
P.A. BALLACHEY
SECY TREAS
PROF T.R. LOUDON
HON CHAIRMAN
J.R. FITZPATRICK
1ST YEAR REP.

# School Athletics, 1929-30

## *The School Athletic Association*

I wish to extend to "School", on behalf of the Athletic Association, my heartiest congratulations on the successes that have crowned your efforts during the past Academic Year.

Surely we should feel proud of our athletes who have garnered no less than six championships and provided two "School" finals. In the remaining sports our teams reached at least the semi-finals and usually the finals.

The activities of the Executive, for the most part, have been similar to the past. A determined effort has been made toward a closer co-ordination between this body and the various clubs. All and sundry have turned in a special effort. I wish to take this opportunity of congratulating Ken Langford, the Fourth Year Rep., upon whose shoulders fell the duty of assuming complete control over all athletic equipment. He has been materially aided by the close co-operation of "most" of the managers. Consequently "School" teams have been equipped as never before.

Charlie Morrisson deserves special mention, for, under his tutelage and watchful eye our track team swept through to two championships—and twelve record medals, a hitherto unheard of number, are forthcoming from the Executive to these knights of the flying heels. And then we have Bill Dowds, the hard driving manager of Sr. Rugby; our bespectacled playing basketball managers, Keith Rapsey and "Tenne" Tenenbaum; Russ Clarke, that rustling Sr. Hockey "boss" and Art. Greene of Jr. Hockey; all are in line for well deserved appreciation.

In past years considerable laxity has existed in the matter of men neglecting to return issued equipment. The situation this year has been much better, *but there is still room for improvement.*

Gentlemen, I appeal to you to render Russ. Clarke, the Fourth Year Rep. of 3T1, your earnest co-operation in the matter. The more equipment turned in at the completion of a playing season means less to be purchased for the ensuing year. As a result the Executive will have more money with which to increase the present stock and make individual awards.

Next year the Executive will function under Alf. Hancock, that well-known and versatile School Athlete and Coach, who merits your whole-hearted support.

In closing, let us hope that continued success will reward the sincerest efforts of those men who faithfully trained to maintain the prestige and honour of their Faculty—and University.

John E. R. Wood,
*Pres. S.P.S. Ath. Assn.*

## *Financial Statement of the S.P.S. Athletic Association*

| Assets | | Expenditures | | |
|---|---|---|---|---|
| Balance 1927-28 | $ 112.01 | B. W. & F. | | $ 80.60 |
| Interest | 2.74 | Baseball | | 67.23 |
| Fees | 1394.00 | Basketball | | 91.30 |
| Fees—late registration | 3.00 | Gym. | | 20.60 |
| Petty Cash | 11.40 | Hockey | | 219.64 |
| | | Rugby | | 385.90 |
| | | Rowing | | 38.30 |
| | | Torontonensis | | 120.00 |
| | | Swimming and Water Polo | | 42.75 |
| | | Soccer | | 98.87 |
| | | Track | | 25.00 |
| | | *Miscellaneous:* | | |
| | | Petty Cash disbursements | | 6.25 |
| | | Department of Photography | | 10.45 |
| | | University Press | | 7.51 |
| | | Notebook | | 3.60 |
| | | Audit 1928-29 | | 5.00 |
| | | "S" 's | | 95.00 |
| | | Milne Studios | | 28.00 |
| | | | | $1346.00 |
| | | *Cash on hand:* | | |
| | | In Bank | $ 169.00 | |
| | | Petty Cash | 8.15 | 177.15 |
| | $1523.15 | | | $1523.15 |

# *"School" in Intercollegiate Sport*

Now, as in the past, "School" has a very formidable aggregation wearing the "T". I must hasten to add that several other men have served on Intercollegiate teams and either have "T's" pending or were just "nosed out".

To begin twith, Lloyd Hallam, Earl Davie, and Johnny Fitzpatrick out-footed, out-kicked, and out-smarted the opposition to place themselves on the Varsity half-line—and the score sheet. Then Mel "Ten Point" Elson developed the inconsiderate habit of gathering in the loose balls of the opposition for touchdowns, while Jack White amused himself by tearing gaping holes in the line. Dinny Traynor, one of the best flying wings to show his wares on a Varsity Gridiron, perforce was the mainstay of the Orfuns—damn those exams?

Then Reg. "Marmaduke" Roome decided to look after the cares and interests of the game from "over 'ome"—and Rugger flourished under his captaincy.

And of course everybody knows "Freddy" Murray of Intercollegiate hockey fame.

Now we have Jim Downing as playing manager of the Intercollegiate and one of the mainstays of the School soccer teams. And Matt. Ward, of course, continued for the third season with "the big team" with his uncanny mastery over the leather. Then Gregg decided the soccer team needed a "man".

There is little need to enumerate the exploits of Ralph Adams and Johnny Fitzpatrick, among Canada's premier sprinters, Olympic men, victors over the best at Madison Square, and what have you. It has been rumoured that they are the birds who taught time to fly.

Walter Connelly is the No. 1 quarter miler around here as everybody knows who saw him finish the intercollegiate relay last fall. Then we have big "Ed. Peaker, the ladies' delight, who tosses the overgrown toothpick out of sight and is an A1 shot putter to boot. "Malc." Smith is the main reason why Connolly travels so fast to win a 440 around these parts.

Bert Tyson became fed up with dislocating vertebrae and studying chiropractics at the expense of McGill and Queen's wrestlers. He decided plastic surgery would be a better calling, and hence his position on the B.W. and F. this year as a boxer and not a wrestler. And we must not forget our two Frosh pugilists, Grant Eaton and Ted Fell, who celebrated their trip to Montreal by Kayoing their opponents right smartly. These two boys are the most colourful battlers Varsity has had in years.

Naturally "Gummy" Rochester, "Wilf" Newman, and "Jerry" Wood horned in on the party. The writer had to scour the archives of the University to ascertain the "why and wherefore" as it were, for their "T's" smelled suspiciously of moth balls. In fact, Mrs.

# "S" Holders, 1930

*First Row*—Mason, Wyckoff, Graham, Wood, Dowds, Crerar, Jim Edmonds.
*Second Row*—Downing, Bridge, Carter, Carmichael, Milne, Peaker, Boyd, Hardy.
*Third Row*—Bill Edmonds, Switzer, Campbell, Bryce, Hayhoe, Fisher, Davison, McKay.
*Fourth Row*—Wilf. Heslop, E. G. Heslop, Gregg, Craig, Hymmen, Smith, Lee.
*Fifth Row*—Wilkinson, Haggart, Moeser, Adams, White, Rochester, Watts, Reed, Grant, Rapsey.
*Sixth Row*—Puddy, Lake, Ward, Powell.
*Seventh Row*—McDonald, Sheddon, McMordie, Chalmers, Armstrong, Withrow, Wilson,

# S P.S "T" Holders, 1929-30


*Front Row*—F. L. Hallam. D. H. Traynor. J. E. R. Wood. A. E. Tyson. J. R. White, E. R. Davey.
*Second Row*—M. Ward. J. A. Downing. W. C. Newman, R. A. Adams, W. A. Connolly, R. B. Rochester. H. M. Smith.
*Back Row*—G. T. Gregg. M. A. Elson, R. M. B. Roome, J. R. Fitzpatrick. E. A. Peaker.

Rochester's pride and hopeful didn't have one for the picture. However, after diligent effort the writer found that "Wilf" is one of the best basketballers in the University and went to the States before Xmas. That board of examiners has kept him idle since. "Gummy" is recorded as having pulled a lusty sweep oar, while "Jerry" says he once played for the Orfuns.

Next year will again bring forth another group of men who will have brought honour and glory to the University—and Faculty.

John E. R. Wood,
*Pres. S.P.S. Ath. Assn.*

## *The Bronze "S"*

The spirit of this award has truly been achieved this year. Wilf Heslop embodies all the qualities, and then some. He has both played on and managed "School" teams of gym, basketball, and baseball throughout his academic course. It is due chiefly to his energy and ability that School has had a habit of winning the interfaculty gym competition. He has naturally been on the Intercollegiate gym squad, of which he was Captain, in this, his final year. In short, Wilf is a true sportsman, a gentleman, and an ardent "School Man".

*Third Year Note.* This award is made by the ballot of the graduating class only. There are no nominations. Contrary to common thought, it is not necessarily for the best athlete or "T" holder. A man may be a good athlete, but a poor "School" man. This award should be made to the man who has done the most work for School, combining executive as well as athletic ability.

# *Senior School Rugby*

In the old days, so they say, it was well nigh impossible to get enough seniors together to play scheduled games, and practices were —"Oh Hell, we'll practice at the first few games of the season."

Conditions are changing and we trust for the better. Last year Senior School won the Mulock Cup, emblematic of the Interfaculty Championship, with ten of this year's team playing for the winners. This year everyone predicted that the Seniors would again win the cup but unfortunately they were eliminated by Victoria College (score 3-1) in the semi-final play off at the Stadium.

One of the outstanding features in this year's try for the championship was the whole hearted enthusiasm and co-operation among the men. Attendance records of players turning out for practice are, we believe, unique in the history of Senior School rugby teams. A total of 21 practices (including 5 games) were held and the average attendance of players was 15. There was no scarcity of material, a total of 24 men being carried on the roll all season. On only two occasions there were not enough players out to practice to fill all of the positions. The following players must have collected a great number of prizes at Sunday School for good attendance. The first two only missed one practice while the remainder missed two practices. Hancock, Joyner, Anderson, Blair, Meyer, Rapsey.* The booby prize, if any, goes to Russ Armstrong.

It may be of general interest to all, and more particularly to some, that the University of Toronto Athletic Association requested the names of Senior School players who might be good enough for Senior O.R.F.U. or Intercollegiate teams for the 1930 season. This seems to be a step in the right direction and we are looking forward to a continued policy of this kind.

Line up—Hancock (Assistant Coach), McVean, Baillie, Davidson, Grosvenor, Wilson, Tyson, Crerar, Little, Zieman, Rapsey, Joyner, Armstrong, Clark, Carruthers, Ballachey, Blair, Anderson, Hardy, Sheddon, Meyer, Fotheringham, Brenneman, Butterill, Wood (Coach).

*It is hard to believe that some of them ever go to S.S.

W. Dowds,
*Manager.*

# *Junior School Rugby*

This season's games, while not productive of a winning team, will live long in the players' memories. It was marked by one of the most long-drawn-out and bitterest series of group games on record. Five times Junior School met Junior Meds to settle what is ordinarily a two-game dispute.

## School Rowing Crew No. 1—Interfaculty Champions

B. B. Puddy, L. K. Walkom, H. E. Davison, W. A. Watts, R. A. Irwin, L. K. Lytle, J. Boyd, G. G. Milne (*Stroke*), I. K. Chalmers (*Cox*).

Seldom have such equally matched teams met. The scores went as follows: 0-3, 2-2, 2-0, 4-4 and 4-13. At times the victory seemed within certain grasp, but eventually it went to our distinguished opponents.

One thing certain, it was a good season. It was worth the admission at any game to see Lichty punt a half-dozen drops, or Muir sneak down the side-lines for a 50-yard gain under cover of darkness. These, of course, only happened when McNichol wasn't in possession, tearing around the end, or squirming through the middle. But for a cheerful, hard worker, Mabee took the prize, and when Pearson whispered "right middle" in his ear, boy! how he ambled. Then, of course, Moffatt "The Great" plugged the centre and Bartleman and Eastwood held up their end, too. Mitchell, the "red menace", was always in there fighting, and the ferocious McArthur was ever dangerous. Hallett is taking up boxing, in preparation for another strenuous series next year. Coulter and Little were steady men and not dismayed by any leering Med.

*Team*—Muir (Capt.), McNichol, Hallett, Howe (another good 'un), McArthur, Pearson, Lichty, Moffatt, Wood, Mitchell, Freeland, Mabee, Coulter, Little, Bartleman, Eastwood, Eaton, Kane, Thompson, Campbell, Wheaton, Jerry Wood, Coach; C. W. Woodside, Mgr.

# *Rowing*

"Easy All." The race is over and again the Interfaculty Rowing Championship comes to the Little Red School House.

Shortly after the opening of the fall term, all the oarsmen and rowing enthusiasts from Science began training on the famous machines in Hart House. The extremely large turn-out was most encouraging, and undoubtedly points to a prosperous future not only for Science but also for University crews.

After a brief training period on the machines, two School crews began more strenuous training in the boats.

Science crews really had an advantage over the other crews in as much that they always had to practice in the dark—hence little was known of their ability.

The School "Freshman" boat won their preliminary heat and qualified for the finals by drawing a bye. This added spirit to both crews and meant that the Senior boat had to do or die.

The Senior boat, after rowing a very ragged race, nosed out the eight from Trinity and then defeated U. C. to enter the finals against the S.P.S. Freshman crew.

The Senior crew again pushed their bow over the finishing line first to win the honors. But the Freshman crew forced them to make the best time of the day, and deserve much credit.

## Water Polo—Interfaculty Champions, 1930


H. L. Hayhoe  R. B. Bryce  J. S. Craig  L. J. Sutton
J. G. Powell  E. O. Withrow  J. A. Fisher  B. S. Crocker  J. C. Towers

The personnel of the Senior Crew was as follows:

Bow—B. B. Puddy; L. K. Walkom 2; W. Davidson 3; W. A. Watts 4; R. A. Irwin 5; L. K. Lytle 6; J. Boyd 7; "Curly" Milne—stroke; I. K. Chalmers—Cox.

I. K. CHALMERS.

# Junior School Water Polo

Junior Water Polo this year aroused even a keener interest than formerly, due to the appearance of a Trinity team in the league. This necessitated a long schedule, but on the other hand gave a greater period for improvement. Certainly at the end of the junior group schedule, the victorious Junior School team was working like the proverbial piece of well-oiled machinery. Victoria provided the most strenuous opposition and a play off with them was necessary before the group honors came to School.

Much of the incentive for such hard playing came from the fact that the Seniors had won their group, thus assuring School the ownership of the trophy.

The best sport of the season was during the two championship games against the Seniors. Some of the best polo ever played at Hart House was witnessed at these games. The first game ended in a tie but the second proved the slight superiority of the Juniors.

All of last year's freshmen players were back, but the success of the team was due a great deal to the perseverance of the several freshmen who quickly learned the tricks of the game. Things look bright for next year's Seniors, and who knows but what the Juniors might duplicate this year's accomplishments if—well it's up to the coming freshmen.

EVAN WITHROW.

# Senior School Hockey

Senior School had a fairly successful season, being finally eliminated by Dents. The loss was not due to the calibre of the players, as their individual playing compared favourably with that of any other faculty. The non-success was due to the fact that they were unfamiliar with the larger ice surface of the Varsity Arena, where they played the game in which they were eliminated. Lack of condition and coaching also helped in their defeat, when valuable opportunities to score were thrown away.

In consideration of the immense amount of work to be covered during the third and fourth years, the boys deserve credit for their showing, and it might be said that they were outlucked rather than outplayed.

Every game played was worth watching, and the traditions of School were upheld most admirably, while the whole team played hard and consistent hockey. The stellar work of Karl Moeser in the nets and Jack Watson at centre deserve special mention. "Stroke" (Bill) Algie can still rush even if he hasn't got condition.

*Alf Hancock*, who believes that life is a loom on which our lives are woven, "body"-checked and the warp went woof.

*Ross Crerar* of "School Nite" fame, is a player of mean ability as well as a bad actor.

*Dave Reed* borrowed the wrong size skates once and forgot to turn corners, but all skidding aside, Dave can shoot, and wields a mean stick, as the chap with the tooth missing "nose".

*Frank Grosvenor* made up with speed and bluff what he lacked in weight, which is considerable.

*Archie Blair* proved to be a dark horse. Girls please note Archie is a blonde.

*"Monty" Montgomery* played a hard aggressive game, and believes in the old slogan, catch-as-catch-can.

*Ken Langford* played a good game on and off the ice. But in the dressing room, girls-wach-out.

R. E. CLARK,
*Manager.*

# S.P.S. Association Football Club

The Club has always taken a very active part in this phase of interfaculty competition, and this year, being no exception, found them in the finals for the Arts Cup.

The team was grouped with McMaster, Wycliffe and U.C. and won all six group games, scoring a total of 17 goals against 3, while in the semifinals O.A.C. were defeated 2-1 and forced to a tie of 1-1 in their return game. In the finals, however, after the very closely contested games, School lost to Knox by 4-2 and 2-1 respectively, thus losing a golden opportunity to regain the interfaculty trophy after a lapse of long years.

Owing to graduation, six of the regular players will be absent next fall, and in wishing them the best of luck for the future, we can assure them that School will carry on.

The personnel of the 1929-30 team is as follows:—

*Goal*—N. F. Helper.

*Backs*—G. McCracken, G. T. Gregg.

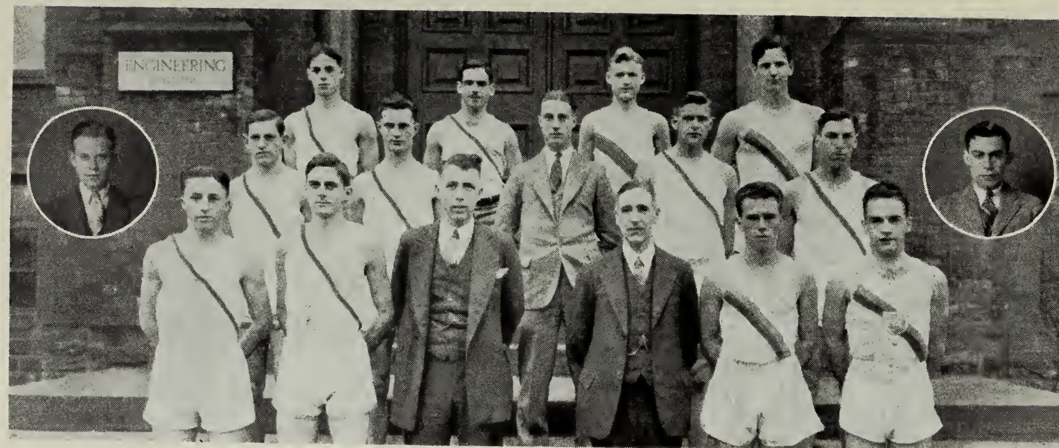
*Halves*—B. Graham, N. C. McKay, G. N. Franklin.

*Forwards*—M. Ward, G. C. McDonald, G. A. Downing, A. R. Wallberg, G. S. Riddell.

*Subs*—H. L. Bayley, E. G. Wyckoff, D. Bridge.

M. WARD,
*Manager.*

# Outdoor Track Team




*Front Row (left to right)*—J. H. Byrne, G. M. Mason (*Pres. S.P.S. Track Club*), C. A. Morrison (*Coach and Manager*), Prof. E. A. Allcutt (*Hon. Pres. S.P.S. Track Club*), J. J. A. Howe, F.S. Lee.
*Second Row*—E. B. Hymmen, J. L. Donaldson, R. A. Adams, W. A. Connolly, M. Smith.
*Third Row*—H. R. Collins, G. A. Lee, J. W. Emerson, E. A. Peaker.
*Inset*—P. A. Ballachey, J. R. Fitzpatrick.

# S.P.S. Indoor Track Team, 1930

*Front Row*—H. M. Smith, H. R. Collins, G. M. Mason (*Pres. School Track Club*), C. A. Morrison (*Coach and Manager*), E. F. E. Barrett, F. S. Lee.

*Second Row*—E. A. Black, J. R. Fitzpatrick, R. A. Adams, E. A. Peaker, J. L. Donaldson, J. W. Emerson, G. A. Lee.

*Third Row*—J. H. Byrne, W. D. Thompson (*Sec.*), E. B. Hymmen, J. J. A. Howe.

*Inset*—Prof. E. A. Allcutt (*Honorary Pres.*).

# *Indoor Track*

The Interfaculty Indoor Track season just closed was a most successful one from almost every standpoint. Not in the memory of the oldest track enthusiasts of this University have so many records for the Hart House speedway been either equalled or broken. This record-breaking orgy was due largely to the efforts of School's two Canadian Olympic runners, John Fitzpatrick and Ralph Adams, although to "Fitz" must go the lion's share. John equalled the old record of 5 3-5 secs. for the 50 yds. dash, and created new records in the "century" and "furlong". His times for both were exceedingly noteworthy, that for the 100 being 10 3-5 and for the 220, 23 secs. flat. The relay teams representing S.P.S. also showed the other faculties just how these events should be run off. The team of Fitzpatrick, Thompson, Smith, Hymmen, Howe and Adams, covered a half-mile in 1.42, setting a new record for this event. Another team of Fitzpatrick, Smith, Thompson and Adams, paced off the mile in 3.38 2-5, beating the old record by 1-5 of a second.

It must be admitted that the field section of the meet was a little below par, the performances in practically every case being quite mediocre. School managed to carry off two firsts, Ralph Adams and Ed. Peaker being the successful ones. Adams won the standing broad jump with a leap (if memory serves correctly) of practically the same distance as that which won it last year, while John Fitzpatrick placed third. Peaker retained his shot-put championship and Barratt got a second in the running high jump. A pleasing feature of the meet was the promising showing of Hertel and Byrne, two of the younger members on the team, in the pole vault. They managed to copp second and third places, respectively.

This year's meeting was again marked by keen rivalry between School and U.C., and not until the final day was S.P.S. enabled to claim their second straight Indoor Track Championship.

E. A. Peaker.

# *Interfaculty Outdoor Track Champions*

The Rowell Cup, emblematic of Interfaculty Outdoor Track and Field championship, comes again to the Old Red School House where it has remained almost continuously since it was donated in memory of Lanky Rowell, our champion hurdler of a few years ago.

School fielded the most evenly balanced team in years, having captured points in every event with the exception of the one mile run. It might also be said that every entry, with one exception,

## Gym Team—Interfaculty Champions, 1930

F. A. Bryan, W. B. P. Brown, J. S. Craig, W. G. Heslop, R. M. Wilkinson.

contributed points towards the victory. Ed. Peaker, interfaculty and intercollegiate individual champion, won two firsts and seconds, while Ralph Adams of Canada's 1928 Olympic Team garnered ten points in winning the 100 and 220 yard dashes. However, every man on the team starred in giving his best towards his faculty and its victory.

It was particularly pleasing to see the freshmen come into the limelight again this year, and with another such influx next fall we should be successful in defending the cup during 1930-1931.

## Gymnastics

Once again the Harold A. Wilson Trophy, symbolic of the Interfaculty Gymnastic championship has been won by School.

This year the competition was keener than ever and the teams more evenly matched. However, with three Intercollegiate men, Wilkinson, E. Heslop and W. Heslop, School managed to bring home the bacon. School's second team of Bryan, Brown and Craig made a very creditable showing also and gave both U. C. and Trinity a run for their money.

This is the first year that any faculty has entered two teams. School may well be proud of the interest her men take in gymnastics. In all she had eight men entered in the interfaculty meet, as two teams of three and as individuals.

The three Schoolmen on the intercollegiate team all did very well both in the intercollegiate meet at Montreal and at the Ontario Championship meet held in Toronto.

This year two of the winning team, E. and W. Hislop are graduating, but with so much promising material and under the able leadership of Wilkinson, the prospects for next year are very good.

E. G. HESLOP,
*Manager.*

## Senior Basketball

This year's Senior Basketball team cannot be said to have wound up the season in a blaze of glory, but the boys all worked hard, and our opponents were given new evidence of the fact that a School team can always be depended upon to put up a good scrap.

Senior Dents and Victoria were paired with us in the group, but the Schoolmen showed their ability by taking all four games, in spite of some keen opposition by Victoria. Perhaps this success was too much, or perhaps the other team were too good, but at any rate, Forestry eliminated us in home-and-home games in the first round of the playoffs, and our sweaters were packed away in the moth-balls again.

The players were—W. M. Hutcheon (Capt.), M. W. Mercer, A. Pasternak, J. R. White, N. F. Helper, F. A. G. Lake, C. L. Sherman, A. L. Wilson, D. B. Ireland, P. A. Ballachey.

KEITH RAPSEY,
*Manager.*

# Junior School Basketball

Although failing to win the Interfaculty Basketball Championship, Junior School made a very creditable showing in Basketball this year. Although we were late in getting started, we soon rounded out a team that promised to give all a battle. We were fortunate in securing a player of the calibre of Wilf Newman. Newman played centre last year for the Intercollegiate team, and being ineligible this year for Intercollegiate sport, turned out with Junior School. With Newman available, we were able to build up a formidable team. The forward line consisted of Britnell, Kirk and Lichty, while Smith and "Dinty" Traynor formed a strong defence. We were fortunate in having strong substitutes who could take their place on the floor without weakening the team.

We were drawn in our group with O.C.E. and St. Mike's. O.C.E. as usual, presented a weak team, but our old rivals, St. Mike's, who were finalists last year, gave us two hard battles before they admitted defeat. We defeated them by the scores of 24-12 and 15-13.

By winning our group, we entered the playoffs. In the first round of the semi-finals, we were drawn against Jr. U.C. Jr. U.C. were picked by many to win the championship. We defeated them in the first game 17-15. The second game ended in a 13-13 tie and gave us the round 30-28, and the right to meet Sr. U.C. in the second round, the winner to enter the finals.

In our first game with Sr. U.C., we obtained a 6-point lead, winning 28-22. The next game was one of the hardest fought battles, ever staged on the Hart House floor. Sr. U.C. started with a rush, and by half-time had wiped out our 6-point lead of the first game, and were 2 points up on the round. In the second half, first School and then U.C. would go into the lead. The period ended with the round tied. This necessitated overtime of 5 minute periods. The first overtime period ended with the teams still deadlocked. In the second overtime period, Sr. U.C. scored 2 field baskets to our one field basket, and a foul shot. This gave them the game 37-30 and the round 59-58. Newman was the star of the game, his playing keeping the team in the fight till the end.

The team was composed of the following players: Centre, W. C. Newman; Forwards, C. B. Britnell, T. A. Kirk, L. J. Lichty, E. C. Lyons, Y. L. Wong; Guards, H. M. Smith, D. H. Traynor, M. G. Weiner, S. Tenenbaum.

S. TENENBAUM,
*Manager.*

# *Junior School Baseball*

We started the season in real fashion by taking Junior Meds into camp by a 10 to 0 score. Several of the men from last year's team were out, and they combined well with the new material from the Freshman class to make a very effective team. George Wilson in the box, pitched good ball, allowing only three hits.

Junior U.C. seemed to be our jinx. Bad luck robbed us of both games with them, the first by 5 to 1, and the second, which was very close, by 8 to 7. In this game it was necessary to play two extra innings to break the tie.

Meds were our prey the second time when we beat them 7 to 3.

Although not successful in retaining the Spalding Cup, Junior School played with the same old spirit that characterizes all "School" teams.

George Wilson did most of the pitching, with Irv Chalmers behind the plate. Wilf Newman, Ralph Adams and Joe Howe played the bases. Tom Carbone and Austin Howe were in close as shortstops, with Bill Carmichael and Eaton getting the long ones to the field. Wilf Wood and Shapiro filled in effectively on several occasions.

E. S. Jewett,
*Manager.*

# *Senior School Indoor Baseball*

From the way things started this year it looked as though Sen. School would field a winning team, but due to the time of the games and too much work, several men were unable to turn out. However, we did not do so bad. We unearthed a smart pitcher in the person of Fred Browers. He appeared, so to speak, at the psychological moment, which was about one minute before our first game started with Sen. Dents, and he pitched a smart game. We were beaten to the tune of 1-0. Sen. Meds defaulted to us so we met Sen. Dents again to decide the group. In this game the Dentists proved altogether too much for us, and we gracefully withdrew from the series.

Carl Moeser held down first base and did it well. Jimmy Edmonds was our stalwart backstop and he held on to the hot shots from Browers like grim death. Dave Reed at third, Frank Grosvenor at short and Younge Lee at second, completed the infield. Rolly Graham, Vic Gladman and Jack Watson made up the rest of the team. We should have done better, but the lack of sufficient practice was evident in both games.

Sen. School should have a real smart team next year, as it will be practically the same as that which won the Interfaculty Championship last year.

E. N. Ward,
*Manager.*

# B. W. & F. Club

And School men are not becoming mellowed with age, in spite of the suggestions of certain songs we sing of "meekness and peacefulness". The art and joy of busting beezers and throwing the odd "flying mare" is as evident as ever.

During the fall a very enthusiastic and successful boxing and wrestling tournament was staged as a preliminary to the "beezer" season. One and all had a good time, and were satisfied that the freshmen were going to be heard of again in the season.

The men gained more valuable experience in the Junior Assault, where School won more final bouts than any other Faculty.

And then, when the dust of the Senior Assault had cleared away, no less than seven School men found themselves among the chosen sixteen, and on their way to McGill to battle for the Intercollegiate title.

Harry Field, battling for his second season in an Intercollegiate ring, was just nosed out. He should sail through with a win next year, and no foolin'.

Ted Fell of First Year knocked his luckless opponents out with monotonous regularity. Rumour has it that his next opponent will be a young wildcat, just so he will have someone to extend him. He packs forked lightning in either mitt, as most of us know.

"Firpo" Eaton, the Dempsey of the crowd, tore in to hang the knockout drops on two of the lads within two minutes in each bout. This amicable young gent is now the 175 lb. Intercollegiate Champion. A two-minute silence is held when this boy lets drive.

Bert Tyson, after winning the 175 lb. wrestling title last year came back to represent Varsity in the heavy boxing. Unfortunately Bert came up against one of the best men to show his wares in this class in Intercollegiate circles for some time. A man to keep on good terms with.

Bill Brownlee is another who took a flip, but this time it was from boxing to wrestling. Bill didn't win, but just watch him go next year in the 118 lb. class.

Bannister was stepping on the gas and on his way to the Intercollegiate title when he was foolish enough to dislocate his shoulder. Nothing daunted, he kept the gas down and went on to win the bout. Next evening, shoulder or no shoulder, Mr. Bannister stepped into the ring, gritted his teeth, and stepped out the Intercollegiate Champ.

Doug. Smith surprised all, including himself, by putting the screws to the best McGill and Queen's could serve up in the 160 lb. division. Watch this exponent of the mat travel in future.

Harry Fields will look after the destinies of the Club next year, and all augurs well for the future.

J. E. R. Wood,
*Pres. S.P.S. Ath. Assn.*

# *The Rifle Association*

The Rifle Association is a university organization in which School takes an active part and, in its accustomed fashion, captures most of the trophies. This happens with the least possible commotion, and not very many know much about it. So perhaps a short resume of the "how" and the "to what extent" will be in order.

The season started last fall with a few days practice at Long Branch leading up to the annual Intercollegiate and Interfaculty Outdoor Matches in October. These matches are shot at 200, 500 and 600 yards; the eight high men forming the Varsity team, and the five high men from each faculty their college team. Cooey and Jacobi for School, made the Varsity team—a modest 25 per cent. But Cooey led the team to secure the Gold Medal and third place in Canada with a 99. The School team, composed of Cooey, Jacobi, D. C. Smith, J. V. Reid and A. C. Macnab, won the Interfaculty, and the DeLury Shield, with an average, only fair, of 87 (possible 105). This completed our outdoor work and we moved to winter quarters at Hart House.

This year the Association entered two new competitions: the D.R.A. Gallery Practice, and the Inter-University Miniature Rifle. Each match consisted of three monthly shoots, the ten highest men each month making the teams. The standard D.R.A. 25 yard targets are used. These have a 5-16 inch diameter bull, as against the inch diameter bull of the Association targets. This, combined with the irregularities of the reduced charge gallery ammunition, makes high scores in the Gallery Practice (.303) match almost phenomenal. In spite of this combination of difficulties the final team average was 89.1 (possible 100).

In the Miniature match (.22) the bull is the same size, but the accurate rifles and ammunition fail to provide a convenient alibi for the odd point dropped. Consequently the Miniature team turned in an average of 94.9 (possible 100) which stands a good chance of coming out on top.

School was well represented on the teams, and of the few who made them three times running are Cooey, Macnab and Hendrick in the .303 match, and Cooey by himself in the Miniature Rifle. This crack shot also led the former team and won a special prize; not to mention a first-class spoon. In this last award, he shares honours with Macnab, who also won a spoon.

The final match of the year was the Interfaculty Indoor Shoot for the Mitchell Cup, captured last year by School, after Dents had held it three years running. This is a gallery practice (.303) match, and the five high men constitute the team. D. C. Smith, Hendrick, Clark, Macnab and Jacobi turned in a new record team average of 96.4 (possible 100) to retain the Dean's bullet-shaped trophy.

Besides these matches, the Association holds monthly spoon shoots, which give the individual members a chance to add to their stock of souvenirs from the Soph-Frosh Banquets. Everybody is given an equal opportunity by classing the members into four groups according to their skill, and awarding a spoon to the high man in each group. One has to improve, however, because all such winners "graduate" to the next higher group. Three Schoolmen won spoons this year: Carter, Hendrick and Reid.

It will be noted that, among the Schoolmen on the various teams, three of the leaders are from 3T0. This means that the "casualties" will have to be replaced next year (we hope!) if the Mitchell Cup and DeLury Shield are to remain at home. So any Schoolmen, and especially frosh, who are interested in the art of placing a hunk of lead in the centre of a specified area from an inconveniently distant location—turn out next fall when the Notice Board calls. If you can shoot we need you; if you can't, we'll teach you.

## BALANCE SHEET

## ENGINEERING SOCIETY—UNIVERSITY OF TORONTO

February 28, 1930

### Assets

| | | |
|---|---|---|
| Cash in Bank—Current | $4,470.16 | |
| Cash in Bank—Savings | 130.81 | |
| Cash on hand | 184.90 | |
| | | $4,785.87 |
| Accounts Receivable | 216.75 | |
| Employment | 50.00 | |
| Suspense—Returned Cheques | 67.00 | |
| | 333.75 | |
| Less Reserve | 276.12 | |
| | | 57.63 |
| Inventory—Merchandise on hand | | 2,616.56 |
| Investments—Victory Bonds, etc | | 5,540.00 |
| Office Furniture | 692.74 | |
| Less Reserve | 470.00 | |
| | | 222.74 |
| Smoking Room Furniture | 70.00 | 10.00 |
| Less Reserve | 60.00 | |
| | | $13,232.80 |

### Liabilities

| | | |
|---|---|---|
| Accounts Payable | | $1,196.17 |
| "At-Home" accounts unpaid | | 1,539.24 |
| Surplus Account: | | |
| Balance—March 31, 1929 | 8,231.12 | |
| Surplus Earned 1929-30 | 2,266.27 | |
| | | $10,497.39 |
| | | $13,232.80 |

# BALANCE SHEET

## ENGINEERING SOCIETY—UNIVERSITY OF TORONTO

### Operating Account—Supply Department

March 31, 1929 to February 28, 1930

| | | | | |
|---|---|---|---|---|
| Inventory— | | | Sales...... | $11,701.07 |
| March 31 1929.. | $1,905.02 | | | |
| Mdse. Purchases.. | 9,457.31 | | | |
| | 11,362.33 | | | |
| Less Inventory— | | | | |
| Feb. 28, 1930... | 2,616.56 | | | |
| Cost of Goods Sold.......... | | $8,745.77 | | |
| Salaries.................... | | 720.00 | | |
| | | 9,465.77 | | |
| Gross Profit to General Operating Account............ | | 2,235.30 | | |
| | | $11,701.07 | | $11,701.07 |

### General Operating Account

From March 31, 1929 to February 28, 1930

| | | | |
|---|---|---|---|
| Publications........ | $178.18 | By Gross Profit— | |
| Music—Piano...... | 24.75 | Supply Dept..... | $2,235.30 |
| Telephone.......... | 87.84 | By Fees........... | 1,397.00 |
| Ties................ | 88.20 | By Interest from Investments and Savings......... | 99.43 |
| By-Laws........... | 61.00 | | |
| Damage—King Edward Hotel—Collectible from 2nd year............. | 50.00 | | |
| Delegates' Expenses. | 57.45 | | |
| Entertainment of Guests........... | 57.69 | | |
| Sundry Expenses.... | 58.43 | | |
| Interest and Discount............ | 16.72 | | |
| School Dinner...... | 297.00 | | |
| Grants—Debating Club............ | 50.75 | | |
| Donations and Awards.......... | 155.50 | | |
| School Night....... | 10.78 | | |
| Photographs........ | 97.80 | | |
| Election Expense.... | 52.14 | | |
| School "At-Home".. | 121.23 | | |
| | 1,465.46 | | |
| Net Profit to Surplus Account......... | 2,266.27 | | |
| | $3,731.73 | | $3,731.73 |